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Taking

Impressions of the Mouth.

BY

JAMES W. WHITE, M.D., D.D.S.

SECOND EDITION, REVISED AND ENLARGED.

To which is added a Catalogue of Impression Trays, Materials, and Appliances.

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TAKING

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TAKING IMPRESSIONS OF THE MOUTH.*

Preliminary Considerations.

THERE is probably no other department of dental practice in which so large a number of practitioners find themselves at times unsuccessful as in the taking of impressions of the mouth. It is hoped that in these pages, in the preparation of which advantage has been taken of all the available literature of the subject, practical hints are presented which will be of service, to beginners at least, in helping them to the attainment of better results in practice. A correct impression of the mouth is absolutely essential to the construction of a satisfactory denture. Without this to begin with, no subsequent care or skill can secure a good result, no matter of what material the base may be composed.

Importance of a correct impression.

The first thing to be considered is the character and condition of the mouth,—1, whether there are teeth remaining or not; 2, if so, their shape and position; 3, the character of the arch, large or small, deep or flat; 4, the ridge, irregular or smooth; 5, the state of the gums, if uniformly hard or soft, or hard in some places and soft in others, *e.g.*, ridge hard and palate soft, or ridge soft and palate hard. When an artificial denture with a vacuum-chamber has been worn, or a plate or appliance of any kind has imbedded itself in the soft tissues, or caused irritation, it is well to have the patient dispense with its use for several hours previous to taking an impression.

Conditions of the mouth.

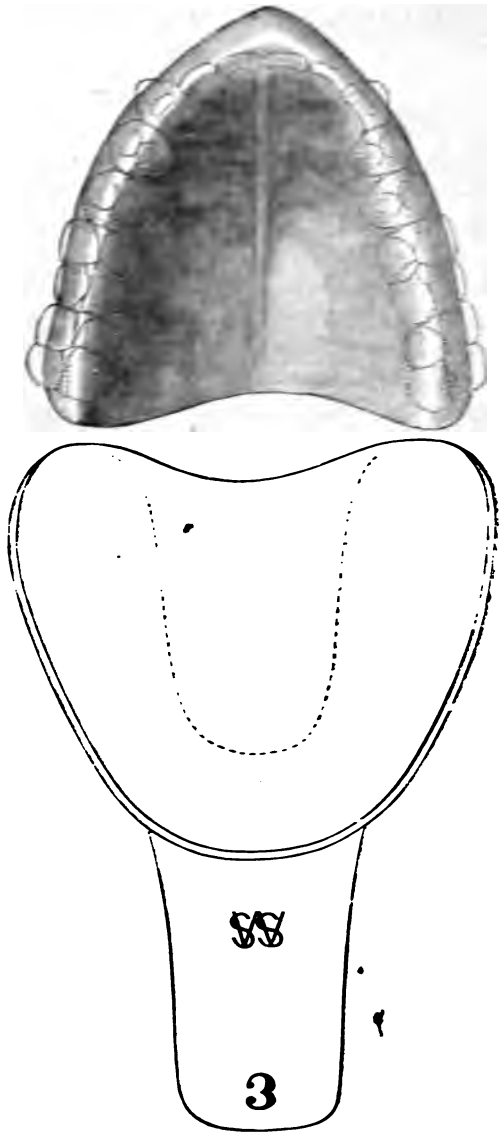
Selection of the Tray.

Having ascertained all the difficulties to be overcome, the next step is to select a suitable tray with which to take the impression. This should be of such shape and size as will allow of its easy introduction into the mouth. It should also be adapted to the particular case in hand, and to the material to be employed. It should be large enough to embrace the alveolar ridge, leaving a space of an eighth to a quarter of an inch between its outer rim and the gum. The nearer within

Shape and size of first importance

* Shortly before his death in 1891, the late Dr. James W. White, in anticipation of a sometime to be required second edition of his useful and popular monograph on "Taking Impressions," carefully revised the work, adding whatever would enhance its value and culling out what had become obsolete. This manuscript, carefully edited so as to omit nothing useful which the last three years have brought to light, is now published.

these limits it comes to fitting the mouth, the less material has to be employed, with consequently less surplus to offend the patient, the less pressure is required, and the more perfect the impression is



likely to be. On the other hand, it must not fit too exactly; else *drawing* or stretching, if the impression be of wax, or complicated *fracture*, if it be of plaster, will be almost certain to occur. The

proper size and shape should be determined by trial of the empty tray in the mouth.

The inferior jaw more difficult than the superior.

More care is required in the selection of a tray for the inferior than for the superior jaw, for the reason that, owing to the divergence of the former at the posterior part, and the extreme narrowness of the ridge, a slight variation will cause it to cut into the soft tissues and so become painful to the patient, besides preventing a correct impression. The tray should pass well back toward the rami of the jaw and cover the border completely. If teeth are remaining, a tray specially adapted

When teeth remain.

DR. DORR'S IMPRESSION-TRAY.

Cut tray to permit passage of the teeth.

to such cases should be used, either deep enough to receive them or with a portion of the tray cut out to permit their passage.

Trays for every need.

A varied assortment of special trays of britannia metal is supplied by the manufacturers, adapted for entire or partial upper and lower cases, and for crown- and bridge-work ; others adaptable to varying necessities, the shape and size being readily adjustable by bending or twisting to meet unusual presentations of the teeth, gums, or palatine arch. In some the side-walls are cut free from the bottom (see page 47), and in others the palatal portion is cut free, with slots running

Adjustable trays.

across the bottom toward the rim (see pages 47 and 48). Some are made with flat bottom and square sides (see pages 44, 45, 46), and others with raised palatal edges, to prevent the plaster slipping off the tray (see pages 49 and 50); still others with the rim of the tray adjoining the handle cut away, so as to procure a perfect impression of undercuts or shelving gums (see page 50). For partial lower dentures trays are provided with an opening to allow the front teeth to pass through, and the tray to pass down to the maxillary ridge (see page 57). An adjustable lower impression tray suggested by Professor Henry I. Dorr has posterior lingual wings, which enable the operator to obtain an accurate impression of the jaw on either side of the tongue, the wings being easily spread apart or brought toward each other, or twisted to adapt the tray to almost any size or shape of the edentulous lower jaw.

Dorr's impression tray.

Adapting trays to special cases.

A tray of the ordinary form may readily be built up with modelling composition or with wax, or bent or refashioned in some instances with better results, to adapt it to a special case, provided it is of sufficient size to admit the necessary additions. In any case, the tray should possess a reasonable adaptation to the alveolar ridge and palate, if a perfectly satisfactory impression would be secured. The objections to the porcelain tray are that it cannot be modified to suit special cases, and is so smooth that the impression material may leave it and cling to the mouth. This latter objection may sometimes obtain with a new britannia tray, but in such case a little roughening of the surface will cause the plaster to adhere. If in a special case it is desirable for the impression to remain in the mouth when the tray is withdrawn, it is only necessary to oil the metallic tray before putting the plaster in it.

Porcelain trays objectionable.

Tray leaving the impression in the mouth.

Emergency expedient.

An emergency tray which will answer a very good purpose may be made by taking an impression in modelling composition or gutta-percha, and enlarging it to make room for the impression material, either by cutting out or pressing with the fingers before it is perfectly hardened.

Selection of Impression Material.

Having decided upon the tray to be used, the next question to determine is the material to be employed.

If the object sought in taking an impression is to obtain a correct representation of the parts as they are in their normal condition, there is needed a substance plastic at ordinary temperatures, and which will admit of having the parts concerned pressed into it without the use of force enough to cause any of *disturbance in relative position and form of the different surfaces*. It must also possess sufficient body or consistence to be retained in the tray under the pressure necessary to obtain an impression of the parts. It must solidify or harden in a brief time,

Necessary properties.

and under conditions as to heat and moisture not incompatible with those found in the mouth. It must not materially contract or expand in cooling or hardening, and at the same time should as nearly as possible be free from objections as to taste, smell, and appearance.

Various material

The substances or compounds in use differ widely in their physical characteristics,—wax, white and yellow; combinations of wax with paraffin, with gutta-percha, and with other materials; modelling composition; gutta-percha, alone or in different combinations; plaster of Paris, alone or conjoined with the use of wax. It would doubtless be unsafe to say that in all cases one of these materials will answer as well as another. Plaster of Paris is more largely used than any of the others. Next in order as to extent of use is modelling composition, then wax and wax compounds, and lastly gutta-percha. A knowledge of the distinctive properties and applications of each is advisable.

Their relative importance

Some special advantages of wax and plaster.

When it is desired to displace soft parts to obtain a uniform bearing for a denture, the absence of elasticity in wax is considered an advantage. If an exact copy of the parts as they present is wanted, the impression to be subsequently carved to displace soft parts to adapt it to the requirements of the denture, plaster of Paris is the most desirable material for taking the impression.

Shrinkage and expansion set off.

Again, a metallic plate struck up on a zinc die is smaller than the mouth from which the impression was taken, by reason of the shrinkage of the zinc in cooling,—unless this shrinkage is compensated for by the enlargement of the sand impression in the removal of the mold; a vulcanite plate is larger than the mouth, because of the expansion of the cast,—unless this expansion is counteracted by the shrinkage of the material in vulcanizing: consequently the compression made by the force required, in taking an impression in wax, or the contraction of gutta-percha, may be made to serve a useful purpose. It is evident, therefore, that no definite rule can be given applicable to all cases; very much must be left to the judgment of the operator. It is frequently difficult to decide in advance which is the best material for a given case; experiment alone can decide.

Wax for beginners.

In the following pages the use of wax is treated of first, because it is the material which is usually chosen by beginners, on account of the ease with which it is manipulated, and also because the general directions for its employment are alike applicable in the use of other impression materials.

Difficulties to be Overcome.

Nausea and its prevention.

In cases of irritable fauces, inducing nausea, it has been recommended to lessen the irritability by previously gargling with a strong solution of tannin, or potassium bromid, or with camphor-water; others have recommended that the fauces be accustomed to the pres-

ence of a foreign body, by passing the feather end of a quill over the parts a few times before taking the impression, or by directing the patient to manipulate the parts frequently with a spoon for a few hours previous to the impression being taken. Such manipulation will, however, sometimes cause nausea and vomiting, especially if practiced after taking a meal. Others consider that the surest way to prevent retching is to force the patient's chin well down upon the breast, after the tray is in place, and so retain it until the impression is removed. Others, again, direct the patient to place the tongue upon the posterior portion of the tray, and retain it in that position. The act of swallowing is likely to produce a sensation of nausea by bringing the soft palate into contact with a foreign body ; the patient should therefore be advised to avoid swallowing during the operation. Nausea is frequently induced by the tray extending too far back in the median line (a fault with many of the trays on the market), and by the *use of too large a quantity of impression material.* In exceptional cases of extreme sensibility of the mucous membrane to contact with any impression material, a 2 or 3 per cent. solution of cocain applied lightly over the soft palate is said to have proven satisfactory. In like cases the administration of a few inhalations of nitrous-oxid gas has effected good results.

Insertion of the tray.

The insertion of the tray may seem a trifling matter to the operator, but it is frequently not so to the patient. Few lips will admit an impression-tray direct without an amount of stretching at once inconvenient and painful ; and, in some cases, to secure a correct impression without subjecting the patient to serious discomfort, will require no little care and expertness on the part of the operator. Unusual width of the jaw is not infrequently associated with a contracted commissure, and, in addition, the muscles of the mouth may be rigid and unyielding. Another difficulty is in the common attempt of the patient *to open the mouth wide in an effort to assist the operator.*

Let the operator control.

The patient should be directed to guard against this by allowing the jaw and the lips to be entirely under the control of the operator, who, standing to the right of, behind, and over the patient, should present the tray obliquely, one side resting against and pressing outward one corner of the mouth, the opposite corner being extended with the first and second fingers of the left hand ; the tray should then be passed in with a rotatory movement to bring it into line. No more impression material should be used than enough to take the impression without overrunning the tray, and so increasing its width, under which circumstances the impression would be squeezed out of shape during its withdrawal from the mouth.

Beeswax.

Advantag of and o jections wax.

The special advantages of wax are that it is easily manipulated, is inelastic, and contracts but very slightly in cooling. The difficulties are: That the pressure required forces all the soft parts out of normal position, and renders a perfect impression of some mouths with it impossible; the tendency to distortion of its form in withdrawing is also a serious objection to its use. It does not give as delicate a result as plaster, but is still preferred by some operators.

When wax is used, either a *pure* article should be obtained, or that which has been judiciously combined with a foreign substance for a specific purpose. Commercial adulterations with tallow, resin, vegetable wax, etc., injure it, making it difficult to manage. White wax has an advantage over the yellow, in that it does not so readily draw out of shape, and there is consequently less liability to have the impression distorted than with yellow wax. It takes a sharper impression than the yellow, but it is more difficult to bring to the required plasticity, and more force is required to obtain a correct impression unless it is made hot. In summer-time the additional hardness is in its favor.

Difference between white an yellow wax.

Scrap wax

Scrap wax of either variety should never be used without remelting, as it is difficult, if not impossible, to get it into a homogeneous mass.

Paraffin in

Paraffin is frequently added to wax, and imparts to it the property of becoming plastic at a lower temperature. A small proportion improves it, especially for use in cold weather; but if in excess, it causes the wax to separate into layers, which are not easily reunited. It takes a sharper impression than wax alone, with less liability of drawing out of form; the addition of the paraffin in proper quantity causing the composition to be harder when cold than the wax alone.

Wax and gutta-pe cha.

A combination of wax and gutta-percha is used, and highly prized by some, on account of its toughness. The objection to it is, that it is sticky. It may adhere to the plaster in making a model unless previously varnished.

Having decided to use wax of either variety or combination, examine the mouth before taking the impression, so as to see the position of the teeth, as a guide to its introduction and withdrawal in a line with their axes, in order to prevent dragging.

High vault

In case of a high arch, select a tray adapted to it, or pile up the wax in the tray to correspond with the form of the mouth. For such cases, some operators cut a piece from the central portion of the tray, large enough to admit the finger, and thus force the wax into the deeper portions of the arch. The practice of others is to dry the mouth with a napkin, and then fill the palatine arch with soft wax, down to a point nearly on a line with the alveolar border, keeping the surface of the

wax [illegible] impression—as with the wax more [illegible] and thus obtain a perfect impression.

During the wax [illegible] either by dry or wet heat, being very careful not to overheat it or produce the peculiar [illegible] which precedes melting. The wax is [illegible] surface. Water has the advantage of softening the wax more quickly and more thoroughly, and it can thus be worked [illegible] without adhering to the hands, which is an annoyance [illegible]. [illegible] however [illegible] the use of water is that some of [illegible] is worked into the wax, destroying to some extent its tenacity. [illegible] dry heat makes it tougher, but more care is required to prevent it from being overheated. If water is used, a [illegible] with [illegible] of water is desirable to secure uniform heating, and a thermometer should determine the temperature. Less than [illegible] will not suffice to make it as plastic as it should be; over [illegible] will cause it to become too adhesive. A better condition of the wax will be secured if it is allowed to heat up with the water. Of the two methods there can be no doubt that dry heating will produce the better impression; moreover the wax will not be liable to leave the tray and remain in the mouth, as it sometimes does when wet heat has been employed. Whether dry or wet heat is used, the wax must be thoroughly worked until the entire mass is plastic throughout. Some operators are in the habit of softening the wax with warm water, subsequently absorbing the moisture by working it in a dry napkin, and then bringing it to the desired plasticity with dry heat. This plan will save time when the wax is in haste.

It has been recommended that the operator should be governed by the condition of the mouth with reference to the softness of the wax. When the gums are uniformly strong the wax should be made quite soft, but in cases where the maxillary ridge in front is soft and yielding, it is well to have the wax fairly hard, so as to press it as closely as possible without forcing the soft ridge; otherwise the pressure in biting will force the plate up, and make it [illegible] on the hard palate.

PREPARATION OF THE MOUTH.

Direct the patient to rinse the mouth with warm water before taking the impression, to remove the mucus. Wiping the teeth with a pledget of cotton carrying a little powdered [illegible] sweet oil or vaseline, proves a useful preliminary to an impression with any material. When the wax is in a soft plastic state it should be immediately placed in the tray, which is previously heated to secure adhesion, avoiding the use of too large a quantity, the usual error of beginners. The surface [illegible] warmed and promptly inserted in the mouth, care being taken to secure the proper position of the tray with reference to the ridge, so

that no portion of the rim may cut into the soft tissues ; it should then be gently but steadily forced up against the parts (passing the finger around the outside of the tray to permit the rim to pass up between the cheeks and gums without drawing the mucous membranes) until the ridge is completely imbedded, and the wax closely pressed against the palatal surface, and held there for a few moments to allow it to cool and harden. The tray should be held steadily and firmly, with two or more of the fingers of each hand on the under surface at about the position of the first bicuspids, the operator standing to the right of, behind, and over the patient.

Imbed ridge completely.

Hold tray steady.

It is better to have the sides of the tray high enough to give the wax support at all points ; but if any is pressed above the edges, it should be brought into contact with the gums by pressure of the finger against the cheeks and lip, so as to insure the filling of all depressions, irregularities, or interdental spaces. Special care should be observed in cases having a prominent ridge. The wax extruding at the palatal edge of the tray should be pressed back into the vault with the finger. The wax must be kept in the mouth long enough to cool and harden. To facilitate the hardening process, cloths dipped in ice-water, or a thin piece of ice wrapped in a napkin, may be applied to the under side of the tray, though there is some risk that the sudden reduction of the temperature of one side may cause unequal contraction. If too much wax has been used, and the impression is injured thereby, trim off the surplus, dip into warm water, and introduce it a second time ; this plan will not answer so well, however, in partial cases, as the teeth will not enter precisely where they belong in the impression. If the natural teeth have been recently extracted, the wax should be quite soft to avoid pressing the soft tissues out of place.

Must cool before withdrawal.

How to cool the impression.

Surplus wax.

Great care is necessary in withdrawing the impression. The partial adhesion by atmospheric pressure tends to draw the wax out of shape, as does also that produced by the adherence of the wax between the approximal surfaces of the teeth ; the impression-tray must therefore be held perfectly firm, allowing no vibration in any direction until clear of the teeth. If the attempt be made to draw it forward, the wax will be forced out of form by the lips of the patient when the mouth is opened too wide, and the impression rendered proportionately imperfect. Care must also be taken to have the tray sufficiently depressed to avoid abrasion by the teeth in its removal, the patient being instructed not to open the mouth too much, as by so doing the width is contracted, and there is liability that the impression may be distorted in passing it through the lips.

Care in withdrawal.

If the impression should adhere tightly to the mouth, as is sometimes the case, its removal may commonly be effected by lifting away the tissues of the cheek, or lip, or by directing the patient to give a slight

Withdrawing adherent impression.

cough, or to blow through the mouth, which admits air, and so breaks up the atmospheric pressure; or, preferably, by *having a hole in the center of the tray, through which a blunt instrument may be passed up to the palate.* Any little displacement of the wax which may be caused by the passage of the instrument will not be objectionable, because it will be in the spot where the vacuum-chamber is required.

Immediately on the removal of the impression, it should be put into a bowl of cold water, or held under the stream of a hydrant, in order to restore its normal hardness, and thus lessen the liability to a change of its shape from handling.

mpression of inferior jaw.

To take an impression of the inferior ridge, a tray adapted to the case in hand having been selected, it should be filled flush with its margins, and introduced in the same manner as directed for impressions of the upper jaw, the operator standing either behind and to the

ressure and counter-pressure.

right of the patient or in front. If behind, pressure should be made upon the tray with the thumbs about over the position of the bicuspids; counter-pressure with the fingers under the jaw. If the position of the operator is in front, two fingers of each hand should make pressure upon the tray, while the counter-pressure should be made with the thumbs beneath the jaw, which may be protected by a folded napkin. It is important to draw out the cheeks before making pressure upon the tray, as the soft tissues are apt to overlap the posterior margin of the alveolar border. The patient ought then to be requested to thrust the tongue out of the mouth as far as possible, so as to free the soft tissues from entanglement. Firm and steady pressure should thus be made, until the ridge is entirely imbedded, when the wax should be pressed around the margin of the tray into all irregular surfaces or depressions, especially against the overhanging ridge at the angles of the jaw.

r. T. Wardle's tray.

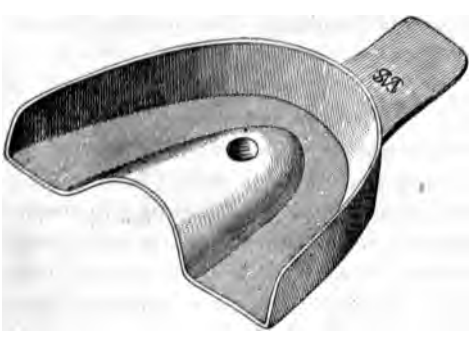
Dr. Thomas Wardle invented a tray, which he brought to the notice of the profession many years since, and which is still used by some operators, for taking impressions in wax, either for partial or full dentures. This tray was designed principally to overcome two obstacles in the way of obtaining a correct impression, viz: where, in cases requiring a partial plate, the shape of the crowns of the remaining teeth prevented an accurate impression at the necks; and cases in which a contracted and high arch made it difficult to obtain an impression with the ordinary tray.

ovable palate plates.

This tray is supplied with movable palate plates, so adjusted as to be capable of forcing the center of the wax up against the highest part of the arch, as well as laterally against the palatal sides of the necks of any remaining teeth, thus securing an exact impression of the parts within the alveolar border.

In the use of this appliance, a suitable palate plate having been

selected and placed in position, the tray is filled with wax, inserted in the mouth, and an impression secured as with an ordinary tray. Then —great care being taken not to permit the tray to be moved from its



position—with a *stout* plugging instrument, pressure should be made against the projecting end of the bar of the palate plate until it will yield no further, taking care that the body of the tray is not forced from the ridge.

Modelling Composition.

Composition and qualities

This material is composed of gum copal, stearin, and French chalk. When of a good quality it takes a very sharp impression, and is adapted to cases of irregularly placed or bell-crowned teeth, or wedge-shaped spaces, or where the teeth incline inward, or in cases of overhanging ridge; its elasticity at a certain stage of cooling causing it to regain its original form after displacement in the act of withdrawal. By judicious manipulation it can be made serviceable in displacing soft tissues where such a result is desired.

Impression of irregular teeth and overhanging ridge.

Used much the same as wax.

The general directions as to the employment of wax are applicable to the use of modelling composition, and trays such as are adapted for taking impressions in wax are suitable also for use with this material.

Special directions.

The directions for its use are to bring water to the boiling-point in an open vessel; remove from over the flame and put in the composition, which when soft take out with a spatula or spoon, and knead with wet hands into shape to fit the impression-tray, which should be previously warmed. Pass through the flame to glaze the surface, and place at once in the mouth. Hold steady a half-minute; push the lips and cheeks in firmly, and with the finger in the mouth press against the palatal or lingual parts. When properly cooled, carefully remove from the mouth and plunge into cold water, *allowing it to remain there until hard.*

To determine when to remove from the mouth.

To determine when the impression should be removed is a matter requiring some experience and judgment. A test of its condition

may be obtained by pressing the thumb or finger-nail into any protruding portion, and observing the degree of hardness.

The whole secret of the successful manipulation of modelling composition lies in working it at such a degree of softness as will carry it beyond its contractile condition, and in making discriminating use of its elastic properties.

GUTTA-PERCHA.

Advantages and objections.

Gutta-percha has been extensively used, and is still esteemed, by some, for special cases. When of good quality, it will take a sharp and delicate impression, but is liable to change its shape when withdrawn from the mouth, and it has a tendency to contract very decidedly in cooling. On this account it is used by some in special cases in which the plate is liable to be loose. Various suggestions have been made to improve it as an impression-material by combining it with other substances, such as magnesia, or chalk. In such combinations it becomes harder when cold, is less sticky when warm, and less liable to contract in the process of cooling. It will take slight undercuts, and, in consequence of its elasticity, with less dragging than wax, but is apt to pass into narrow spaces between the teeth, and the force required to dislodge it injures the impression.

Properties and changes in combination.

Gutta-percha and chalk.

Degenerative changes.

Test for quality.

One great cause, perhaps, of the difference in the estimate of its value by different practitioners, is in variations in the quality of the article used. It is liable to undergo a marked change by exposure to the air, losing its toughness and elasticity; it is then very brittle when cold, and exceedingly sticky when warm. If of good quality, it is easily made plastic by wet heat without sticking to the fingers; if it will not bear this test, it is not fit for use in taking impressions.

Tray for gutta-percha.

Method of use.

For taking impressions in gutta-percha, the tray should approximate the size and shape of the mouth, so as to distribute the material evenly, and not leave in one part or another a superfluous thickness to cause irregular contraction in cooling, and drawing or sucking in the act of withdrawing it. It should be well worked, and freed from bubbles; after which manipulation the surface should be dried, and the mass held for a few moments over a spirit-lamp, and put into a previously warmed tray. This will cause it to adhere to the tray, and so prevent withdrawal from the sides of it, in cooling. If it is desired to take advantage of its property of contracting, it may be dipped again in the water when ready for the tray, which ought also to be wet and cool.

Cooling for removal.

While the impression is still in the mouth, the surface of the tray may be cooled with ice, or a sponge dipped in ice-water; but if the impression is a thin, delicate one, there is danger that the sudden cooling of one side may cause unequal contraction. Care should also

be used not to make it too hard, when there are dovetail spaces between the teeth, or when the teeth themselves are wedge-shaped or conical. A little plaster batter pressed with the end of the finger into the spaces between the teeth, and allowed to set, will prevent wax or gutta-percha from entering. After the impression is taken, the plaster can be removed with an excavator and returned to its proper place in the impression. It is well to dip the impression into cold water immediately upon its removal from the mouth.

Another method.

One operator teaches that excellent results may be obtained by the proper manipulation of gutta-percha, which consists in dipping thin sheets of it in boiling water; taking them out on a glass rod; dipping them into cold water; then filling the tray and placing it in hot water for half a minute; dipping once more into cold water, and promptly introducing the tray into the mouth. He directs that it should remain in the mouth until it is found by testing with the finger-nail that it is just cold enough to spring back into place if moved.

To remove from plaster cast.

No oil or other substance should be put upon a gutta-percha impression before filling with plaster. To remove the impression from the plaster model, it should be put, when the plaster is hardened, into water, of a temperature from 190° to 200° F., and allowed to remain until the gutta-percha is thoroughly softened.

Plaster of Paris.

Advantages.

This material has now been for many years in general use for taking impressions, and its merits are fully established. It requires nicer manipulation, and is not so cleanly as wax; but the results are so nearly certain, with proper manipulation, that they counterbalance any inconveniences attending its use. It readily conforms to the minutiæ of shape and irregularities of the parts to be taken, and if broken presents clean, sharp, well-defined fractures which permit accurate replacement; the pieces being retained in place by a little melted wax dropped upon the lines of fracture on the outside of the impression.

Expansion of plaste

A question has been raised in regard to the expansion of plaster in the process of recrystallization or setting. That it does expand is admitted, but only about $\frac{1}{500}$ of its own measure, which is not sufficient to interfere materially with the success of an artificial denture. It is claimed, and if true it is a curious fact, that it expands less or not at all when salt or potash-alum has been added.

Nature and preparation.

Plaster of Paris is chemically a native sulfate of lime, found in great abundance in many parts of the world. In its crude state it is called gypsum, and is prepared for use by being reduced to a fine powder, and subsequently calcined in ovens at a temperature between 300° and 400° F. When pure, properly ground, and calcined, if mixed with water, a chemical union takes place, which is commonly called a

Factors which control "setting

"setting,"—the combining water condensing from a fluid to a solid, and liberating latent heat, as is usual in such changes, with a consequent elevation of temperature. If overheated in the calcining process, it parts with all of its water, and fails to recrystallize when mixed with water. This accounts, perhaps, for the imperfect solidification of some specimens of plaster. It is sometimes impure, by reason of original or subsequent admixture of foreign substances.

Results of imperfect preparation.

A difficulty may also arise, if the plaster has not been ground sufficiently fine, in consequence of the setting taking place before the coarser particles have absorbed their quantum of moisture. In this case, the expansion, instead of taking place, as it should, while the plaster is soft, is continued after it has solidified.

This quality of setting depends, moreover, not only upon its original purity and correctness of manipulation in the manufacture, but largely upon subsequent care in keeping it, and the manner in which it is mixed for use. As it has the property of absorbing moisture from the atmosphere, it should be kept in a metallic, earthen, or glass vessel, perfectly covered, and in a dry, *warm* place. Frost injures its quality. Plaster which does not work well, by reason of the absorption of moisture from the atmosphere, may frequently be restored by submitting it, in a dish or other vessel, to the ordinary temperature of the baking-oven of a cook-stove until it is thoroughly warmed through. It will not work satisfactorily if cold.

Keep plaster dry and warm.

Preparatory to mixing.

Presuming that it is a pure article, has been properly calcined and ground, and carefully kept, the next item of importance is, that it be properly mixed. It should be passed through a sieve of bolting-cloth previous to being used. Ordinarily, the temperature of the water for mixing should be about 70° F. Ice-water should never be used. Warm (not hot) soft water is the best, if it is desired to have it set quickly. The temperature of the water used will decide largely the time required for its solidification. There is less liability of air-bubbles if warm water is used. The quantity of water used will also determine the period required for the setting; the less water the quicker it will set; but plaster mixed stiff will always contain bubbles.

Tepid water best.

Best way to mix.

The best method of mixing is to take the required quantity of water (easily determined by experiment), sprinkling the plaster into it, by the use of a sieve preferably, until of sufficient consistence; if the reverse plan is pursued—the water poured into the plaster—it will crystallize unequally, and be filled with air-bubbles. A teacup or bowl is the best form of vessel to mix it in. Thorough stirring or beating makes it tough and pasty. The longer it is agitated and beaten, the less subsequent expansion there will be, for the reason that each granule becomes saturated (satisfied) before solidification takes place; whereas, if too little water is used, or the plaster is allowed to set

before the center of the granules is saturated, they will continue to absorb from their surfaces, and expansion will continue with some plaster for a considerable time.

To hasten the setting.

To facilitate the setting, many different substances have been recommended, such as common salt, potash-alum, potassium sulfate, sodium silicate (liquid silex), etc. Of these, the alum and silicate are unpleasant in the mouth, and the latter is unreliable, making the plaster set too quickly, while the potassium sulfate does not appear to possess any superiority over common salt (except that a very small quantity suffices, and in making models it causes no efflorescence). A small pinch of salt is all that is required for an impression ; an excess will cause too prompt setting, and will effloresce, and make the impression rough on the surface,—the tendency to which, however, will be obviated by promptly varnishing it after its withdrawal. A *large* excess of salt will retard the setting. The varying effects of different quantities are shown in the following results, obtained from a single sample of plaster, the quantity of water and plaster being in each case the same : The plain plaster set in five and a half minutes. The addition of two grains of salt caused it to set in five minutes, of four grains in three and a half minutes, of eight grains in three minutes, of sixteen grains in two minutes, of thirty-two grains in one minute, of sixty-four grains in two and a quarter minutes, of one hundred and twenty-eight grains in eight minutes, and a saturated solution required twenty-four minutes.

Influence of salt.

When to add the salt.

The practice of some is to add the salt to the water ; others consider that the best time for adding it is when the plaster is ready for use, and just before it is put in the tray,—the salt thus beginning to act as the plaster is introduced into the mouth, allowing the use of a thinner batter, and yet insuring a speedy setting. The addition of the salt prevents the plaster from becoming as hard as it otherwise would ; but for impressions this is not an objection.

Fluid read for mixing plaster.

Some operators keep ready a pint bottle of water in which has been dissolved a heaping teaspoonful of potash-alum for use in mixing plaster for impressions.

Time of setting.

Plaster should not set too rapidly, nor should it be too long in hardening ; but if a choice has to be made between the two conditions, the latter is to be preferred, for the reason that the slow-setting plaster gives the operator ample time for preliminary management. He should never be hurried, as is likely to be the case in quick-setting plaster. This is of more importance than is generally considered. If it is desired to retard the setting, a solution of white glue, sugar, molasses, or vinegar may be added to the water with which the plaster is mixed.

To retard the setting.

Flavoring.

The suggestion has been made that three or four drops of oil of wintergreen, or cinnamon, added to the water with which the plaster is mixed, agreeably modifies the objectionable taste of the plaster.

Adding pumice.

Dr. L. C. Ingersoll advises adding to plaster of Paris from one-third to one-half of pulverized pumice, according to the strength of the plaster. By this means he claims that adhesion to the teeth is almost entirely prevented, and that there is less liability to fracture of the impression on its removal from the mouth.

Wax and plaster impressions.

Some always take an impression first in wax, giving it a lateral, anterior and posterior movement in the mouth, or subsequently enlarging it by cutting, so as to give space for the batter of plaster with which the final impression is afterward taken. This method is considered specially applicable when the mouth is not uniformly hard,—in some places soft and yielding,—the object being to allow trimming off the impression corresponding to those places where the tissues are yielding, and have been pressed out of place, in order that a greater depth of plaster may be brought into contact with them, as, being softer than the wax, it will allow them to retain their relative normal positions. After the wax impression is taken for this purpose, the surplus wax should be trimmed off, and the surface scored, to make retaining-points for the plaster. To prevent the wax from leaving the tray, its surface should be warmed over a spirit-lamp.

mpressions wholly of plaster of Paris.

For a full upper impression wholly of plaster, the mouth should be carefully examined, and the proper tray selected, one as near the size of the jaw as possible; if it is a high arch, the center of the tray should be filled up with wax, and with the same material any deficiency in the size of the tray at the palatal margin or around the outside edge, especially over the cuspids, should be supplied. Many failures are unquestionably attributable to a want of support in the summit of the arch, permitting the too great bulk of plaster to drop before solidification takes place; a difficulty obviated by having a smaller quantity of the batter sustained by a dome of wax. Some operators recommend a rim of wax to be carried entirely around the periphery of the cup, including the posterior margin; the object being to enable the operator to press in the plaster above the alveolar border, and to prevent in part its being forced too rapidly or in too large quantities over the posterior margin; but care should be taken that this rim be not deep enough to press unduly upon the soft palate, and distort the impression.

)bviating failures.

'osterior margin.

)eep alveolar ridges.

If the alveolar ridge is very deep, or the vault presents the form of a fissure, making considerable space between the tray and the floor of the palate, the tray should be driven up on a mold, corresponding in shape with the form of the mouth; otherwise the plaster will not be carried to the deepest portion of the arch, and thus there will be an imperfect impression of the palatal surface. Another plan is to take up a small portion of plaster on the finger or a spatula, and apply it to the deeper parts of the arch just prior to the introduction of the tray.

Arranging Patient to Take Impression.

The patient should be seated,—a common chair is preferred by many operators,—and instructions given as to position and the reasons therefor; the patient inclining the body slightly forward, and in readiness when the plaster is introduced to allow the head to be thrown still more forward,—the object being to determine any excess of plaster to the front of the mouth, and prevent it from falling into the fauces. Too many directions and an ostentatious preparation will, however, cause failure with timid patients, by inducing undue nervous irritability, from a magnified fear of the operation.

Cover the patient's lap.

When about to take a plaster impression, a towel or large napkin should be spread in the front of the patient's dress to receive any excess of plaster which may be dislodged.

Preparing the mouth

The patient may be directed to dry the mouth with a soft napkin if there is an excess of saliva; but it is rarely if ever necessary in taking impressions of the upper jaw, and some mouths are naturally so dry that the difficulty is rather to prevent the plaster from adhering too firmly to the tissues. In such cases, it is not well to absorb what little moisture there may be. Some operators always direct the mouth to be rinsed with warm water, which, it is claimed, by removing the mucus, facilitates a more even flow of the plaster, diminishes its liability to an undue adherence to the membranes, and produces a smoother and more delicate impression. Some always brush the parts over with glycerol, if the mucous membrane appears abnormally dry.

Impression adhering to the mouth.

Instructions to patient about breathing

Before introducing the tray, some operators instruct the patient to breathe through the nostrils, considering that the liability of fragments of plaster being drawn into the pharynx is much increased when the patient breathes through the mouth.

A contrary view.

The late Dr. Joseph Richardson took, however, an opposite view, arguing that in the act of breathing through the nose the velum palati is depressed to cut off the passage of air through the mouth, and is thus brought more immediately in contact with any portion of plaster that may be protruding from the heel of the tray; that the stimulus of contact produces involuntary contraction, and that thus fragments of hard plaster may be drawn back into the fauces, producing the very evils which nose-breathing is thought to avoid; and that if patients are instructed at all in this respect, they should be advised to breathe through the mouth.

To hasten the setting of plaster of Paris.

The required quantity of water, say two tablespoonfuls, should then be put in a bowl or teacup, a pinch of salt added, and plaster sufficient to make a batter about the consistence of thick molasses should be *sprinkled* in. If put in carelessly, it will become lumpy, and may prove disastrous to the impression. The batter should now be well stirred and transferred to the tray.

To mix plaster of Paris.

The consistence to mix.

The filling of the tray should be commenced before the plaster has set to the point suitable for insertion in the mouth. The rule generally given, to wait until the plaster fails to fall from the spatula, is an

A common error.

error. It is then too stiff to put into the tray; allowance must be made for the time required to place it in the mouth. So long as the surface glosses, when smoothed with the spatula, and does not begin to leave sharp edges, it will take a perfect impression with *very moderate* pressure; but if too thin, difficulty will be experienced from its spreading and running from the tray. The perfection of the impression will mainly depend on the insertion of the plaster, when the

How much plaster to use.

smallest possible pressure will be required. Sufficient plaster should be used to insure the filling of all spaces, with a *small* quantity to spare. A knowledge of the amount necessary can only be acquired by experience; too much makes it difficult to insert, and will also cause a larger amount to be forced over into the mouth,—a result always disagreeable to the patient and unpleasant to the operator.

Introducing the Filled Tray.

When the tray is introduced into the mouth, it should be passed up to the palatal arch, touching the posterior portion of the palate first, to throw all excess of plaster toward the front of the mouth. It should then be brought gently up over the anterior surface until the parts are completely imbedded and the plaster is seen to protrude around the margins of the tray. When the tray has fairly covered the ridge, a slight vibratory motion should be given to it to settle the plaster and dislodge any bubbles of air; at the same time the head of the patient should be thrown well forward and the body still more inclined. The formation of air-bubbles in the roof of the mouth cannot be thus

To avoid air-bubbles.

prevented; this liability must be guarded against by having the plaster high enough in the center of the tray. The tray, when once placed, should be retained in its *exact* position with great care until the

The operator to hold while plaster sets.

plaster sets. The operator himself should always hold it, using no more pressure than is necessary to keep it in place and retaining it, not by the handle, but by one or two fingers of his right hand upon the center of the tray, with his left hand resting upon the patient's head. The tray should never be intrusted to the patient. At the same time the lip should be extended and brought down over the tray, subsequently making pressure on the lip and cheeks to force the plaster well up on the outside of the ridge. When the alveolar ridge is much absorbed, the foldings of the mucous membrane should be prevented from becoming involved by pressing them out with the fingers.

Danger in improperly introducing the tray.

The liability of having an excess of plaster pass backward toward the pharynx is a real danger. A serious accident of this nature might readily occur. It not infrequently happens, when the tray is pressed

anteriorly first, that a large excess will pass over and interfere with respiration. This excess is liable to fracture when hard, and, becoming loose, may pass into the pharynx and endanger the patient. To obviate this it has been suggested to place around the palatal surface of the tray pieces of string, extending slightly beyond the posterior margin, which, becoming imbedded in the soft plaster, will draw out any portion that may become loose. This precaution is, however, unnecessary, if care is taken not to use an excess of plaster, to bring the posterior portion of the tray first into contact with the palate, and to have the patient lean well forward.

How to avoid it.

To judge when the plaster is hard enough to remove from the mouth, the evolution of heat, as the result of the chemical action which has taken place, will be a guide. It has been recommended to test by the fracture of the plaster left on the edge of the bowl in which it has been mixed ; but, while some say that the secretions of the mouth feed the plaster and prevent it from hardening as soon as that in the bowl, others contend that the heat of the mouth causes it to set somewhat quicker. The safest plan, therefore, is to test that on the edge of the impression, or to know by previous trial the "behavior" of the plaster used, and determine by the *watch.*

When to remove from mouth.

When ready to withdraw the tray from the mouth, the upper lip should be stretched upward, at the position of the second bicuspids, with the left hand, so as to admit air between the plaster and the gum ; at the same time the tray should be pressed downward with the right hand. If the plaster is left in the mouth too long after it hardens, it is likely to adhere very strongly to the mucous membrane, owing to the absorbing property of the plaster. In such cases no undue force should be used in the withdrawal, as there is liability to tear the membrane ; the only plan is to *coax* it out. The tissues of the lip and cheeks should be lifted alternately, and, if necessary, the patient directed to give a slight cough ; or, upward pressure upon the handle of the tray may be made, which will depress it at the heel ; or, with a suitable instrument, the soft palate may be pressed up to admit the air ; or, preferably, through a hole in the center of the cup, a blunt instrument may be passed up to the palate, and thus admit air between it and the impression. By this means there is less danger of injuring the impression than by introducing air at the sides, which can only be done by more or less depression of the tray. These means will generally, with a little patience on the part of the operator, effect removal without damage to the mouth or to the impression. A pair of foil-pliers should always be at hand, to take out of the mouth any pieces of plaster which may break off during the withdrawal of the tray. These pieces should be rinsed clean of saliva, and replaced on the impression, after hardening, with great care and nicety.

How to withdraw impression.

Danger in leaving too long in the mouth.

Air to facilitate the removal of the plaster impression.

Pieces of plaster which break off.

Another way of admitting air.

It has been recommended, to facilitate the removal of an impression, that a small hole be made in the center of the tray, through which a fine cord or thick thread is passed so that a quarter of an inch of its end shall project from the surface of the impression-material. Before removing the impression the cord is drawn out, thus admitting air to the vault to facilitate the detachment of the impression.

As a further aid in overcoming persistent retention of an impression, the patient may be asked to perform the act of swallowing.

Plaster impressions of the lower jaw.

In taking impressions of the lower jaw, for a full denture, the tray should be adapted to the case in hand as to depth and shape of rim, which should extend downward on its lingual extremities so as to secure an accurate impression of the lingual aspect of the ridge. It is

Plaster to partially set before introduction.

necessary to allow the plaster to set until it will not drop from the inverted impression-tray. It should then be placed in the mouth, and carefully depressed at the posterior portion first. When the patient has an excess of saliva, care should be taken to have the mouth dried with a soft napkin. After filling the tray flush with its margins, the operator should introduce it into the mouth in the manner heretofore described, standing either to the right and over or in front of the patient. If the latter position is chosen, after having adjusted the tray—which of course is bottom upward—properly over the ridge, the first

Proper methods of applying pressure.

two or three fingers of each hand should be placed upon the top of each side of the tray, over the position of the bicuspids, and the thumbs underneath the jaw, steady and firm pressure being made until the ridge is wholly imbedded, the patient sitting in the position recommended in taking upper impressions. If the operator stands behind the patient, pressure should be made upon the tray with the thumbs, and counter-pressure with the fingers under the jaw, care being taken to draw out the cheeks before making pressure upon the tray, as the soft tissues are apt to overlap the posterior margin of the alveolar

Freeing the soft tissues.

border. The patient should then be requested to thrust the tongue out of the mouth as far as possible, so as to free the soft tissues from entanglement. When the plaster has set, the tray may be freed by pressing the finger of the left hand against the inner surface of the cheek, outward and downward, so as to admit air under the impression.

Special Cases.

Where great absorption of the maxillary ridge has taken place.

In middle life, or in old age, when there has been great absorption, the muscles of the mouth are on a line with, or sometimes higher than, the maxillary ridge; the outer edge of the tray should then be turned out at a right angle with the body. If the edges of the tray are too straight, or the two sides are in nearly parallel lines with each other, the outer edge presses the muscles down over

the maxillary bone, and when the reverse is taken from it there will be a sharp-ridged cast; and when the plate is made to fit the cast, the edge will cut the muscles, and make a sore mouth. But by using a tray with the outer edge flared (see lower tray, Nos. 5 and 6, pages 54 and 55) so as to drive the cheek outward, the muscles are drawn on a line where they are connected with the ridge of the jaw, and more nearly in their natural position. When a plate is made from an impression so taken, the muscles will have free play under the edge of the plate, and will not lift it from the jaw and float it around the mouth.

To avoid a sharp-ridged cast.

In taking impressions for partial cases, to prevent difficulty in the withdrawal of the impression, the shape and position of the teeth should be carefully noted, and manipulations made accordingly. Before taking the impression, undercuts, etc., should be looked for, which must serve as a guide in the withdrawal of it. Where the teeth are wedge-shaped, or conical, or straight and short, there will be no difficulty; but where they are long, or inclined, or where the necks are smaller than the crowns, they will not deliver without fracturing the plaster. In some cases a little wax, pressed into the interdental spaces, may serve a good purpose by preventing the plaster from entering. The impression should be removed from the mouth before the plaster has set so as to make it liable to fracture, or else allowed to remain until it is sufficiently hard to make a clean fracture. There is danger, however, if there are loose teeth in the mouth, of extracting them in the removal of the impression.

Undercut impressions.

In case of loose teeth.

In such cases it has been recommended to dry the teeth, and put a cylinder of wax around them; and, if great care and nicety is observed, this plan will give good results. It has also been suggested to take fibers of raw cotton and place in the tray where the teeth will strike, and run some thin plaster over it in the form of batter. This will prevent the plaster from breaking up into such fine particles as it otherwise might.

Various plans have been recommended for taking impressions of difficult cases. The following embrace all that are thought to be of special importance:

Impressions of difficul cases.

Having taken an impression in wax, a metallic die and counter-die are made, as for ordinary plate-work. From this a plate of brass, tin, or zinc is struck up, to be used as an impression-tray, the palatal surface of which is coated with a thin batter of plaster, and applied to the mouth in the usual manner. Others prefer taking a wax impression, from which all those portions indented by the teeth are subsequently cut away, allowing only so much of the wax surface to remain as corresponds with the artificial base to be supplied. This is subsequently employed as a tray with which to take a plaster impression.

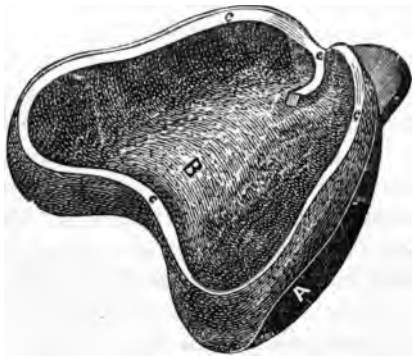
Temporary trays.

Converging teeth.

In case of converging teeth, the spaces between them may be first packed with thick mixed plaster (or with modelling composition or wax), and the sides sloped smoothly, so that when sandaracked and oiled, the subsequent impression will on removal leave the sections in the mouth. They can then be laterally displaced and returned to the impression.

Dr. A. Westcott's plan for full denture.

A process for taking plaster impressions for entire superior dentures was suggested by Dr. A. Westcott. Take a wax impression as a preliminary step. When cold, carve with knives curved laterally, and with bent gouges, with great care. After deciding as to the proper form and size of the impression, and in a general way trimming off all the wax which is not needed, make a cut in the wax one-eighth of an inch deep on the inside of the impression, and about one-eighth of an inch from the margin. This cut should follow the entire margin of the wax impression, and across the palatal surface. Now



carve out the entire surface of the wax to the depth of from one-eighth to one-quarter of an inch, except a narrow strip, perhaps one-quarter of an inch wide at the extreme front, and at the place of greatest depression in the wax. When this impression is replaced in the mouth, it rests firmly upon the unchanged strip running across the rear end of the palatal arch, and at the same time bears upon the uncarved strip at the front of the impression.

An impression having these resting points can be held steady by pressure bearing upward against the center of the impression-tray long enough for the plaster to set.

Partial Cases.

Governing fractures in partial cases.

There is a liability, in partial cases, that the plaster will break in a number of pieces. To determine in advance the lines of fracture,

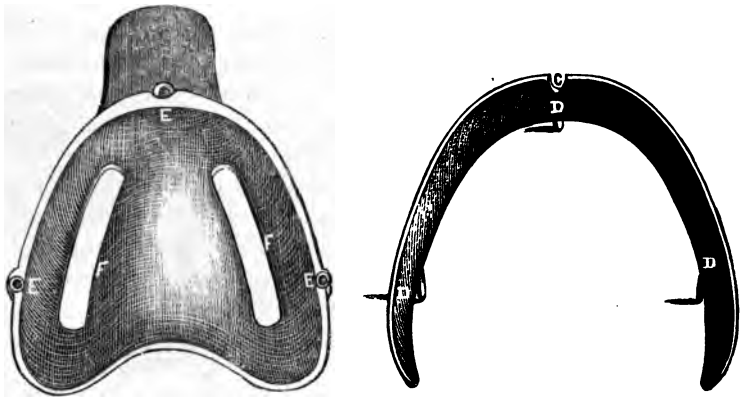
Dr. A. G. Bennett's suggestion.

Dr. A. G. Bennett suggests that the impression-tray be warm and a narrow strip of base wax attached to its floor, dividing the space between the outer rim and the palatal projection; a like strip running

from this to the rear of the tray. The tray is then to be oiled, filled with plaster, and the impression taken. The tray comes away leaving the plaster adhering to the teeth, the wax remaining in the impression, and serving as a guide to show where it may be cut. The impression may then be removed, the pieces replaced in the tray and attached with fresh plaster.

Dr. A. Westcott's plan for partial cases.

Dr. A. Westcott described a plan for taking impressions for partial cases with plaster: Saw off the rim of an ordinary tray with a fine saw, and again couple it with the palatal portion by brass dowels. Take the rim and solder on to it three short pieces of brass wire,—one on the front and one on each side of the rim. Next, solder on three short pieces of brass tubing, corresponding in position and in



size of hole with the wire dowels already soldered on to the rim. By this arrangement the rim may be removed and replaced at pleasure.

Making the wax stick to the tray.

As it is very desirable to bring away the wax and plaster with the palatal portion of the tray, provision must be made against the cleavage of the wax from the tray. This may be done by holding the tray over a spirit-lamp, and securing an adhesion by melting the wax; but a much easier way is to perforate the base of the tray. In taking the wax impression preliminary to the plaster impression, the wax will press through these orifices more or less, and by spreading out like the head of a rivet on the bottom of the tray, make a strong and secure hold when the wax is cold. These orifices will be found a convenience in any case of plaster impression-taking.

When the two parts of the tray are placed together so as to form a tray of the usual form, and the wax impression taken, as above described, pass a thin blade through the seam or joining, and separate the wax so that both rim and wax may be easily taken from the lower or palatal portion of the tray. Separating the two parts on this line leaves all, both plaster and wax, within

the rim in the mouth, while the palatal portion is removed. To remove the portion embraced within the rim easily, and without unnecessary crumbling, spring off first one end of the rim and then the other, and remove the rim from the mouth. Then, by a thin, though not sharp, knife, or firm spatula, divide the plaster, which is still in the mouth and outside the teeth, into three sections, which may generally be removed without breaking elsewhere, and in such way that the pieces may be readily returned to their proper places. There may be *cut-offs* of wax placed where it is desired that the plaster should separate, so that the sections may be very easily removed. These cut-offs consist simply of thin plates of wax set up edgewise, so as to divide the plaster while thin into any number of sections, and reach from the rim of the tray to the teeth or gum.

:ut-offs.

In taking an impression where there are teeth with spaces of naked gum between them, and especially where the teeth are bell-crowned, it is well to set up thin slips of wax from tooth to tooth, or else leave such cut-offs, when carving the wax, to make room for the plaster. In taking impressions for partial sets, there is not the same necessity for providing against the rocking of the impression-tray, as the depressions made by the teeth in the wax are not obliterated by the carving, and these will serve as the steadying-points when the wax is returned with the plaster for the final impression. By carrying out these suggestions, there is no more difficulty in getting a perfect impression of *every part* in mixed cases than pertains to full sets where the gums are entirely naked.

Teeth with vacant spaces between.

Dr. S. E. Gilbert suggested the following method of taking a partial upper impression: Place enough plaster against the palatal surface of the tray to fill the mouth even with the masticating surfaces of the teeth, adding a little plaster around the inside of the rim; a rim of wax having previously been built across the palatal edge of the tray.

)r. S. E. Gilbert's method of taking an upper partial impression.

Dr. W. N. Chaffee suggested this plan of taking a perfect impression in plaster for a partial set, when the remaining teeth are long, and have large crowns, small necks, and incline toward one another:

)r. W. N. Chaffee's plan for partial impression in plaster.

Select an impression-tray of suitable dimensions, preferably with a square-turned rim, instead of an oval one, as it accommodates the teeth much better. Prepare the tray by bridging across the back edge with a thin strip of wax not thicker than a knife-blade, to prevent the plaster from dropping over into the throat.

Then soften some wax in warm water, making it as soft as possible without melting, and roll it out into a stick as large as the little finger, and long enough to pass around on the inside of the border of the tray, from heel to heel. Heat the tray over a spirit-lamp sufficiently to attach the wax to it, and lay the wax in around the border. The

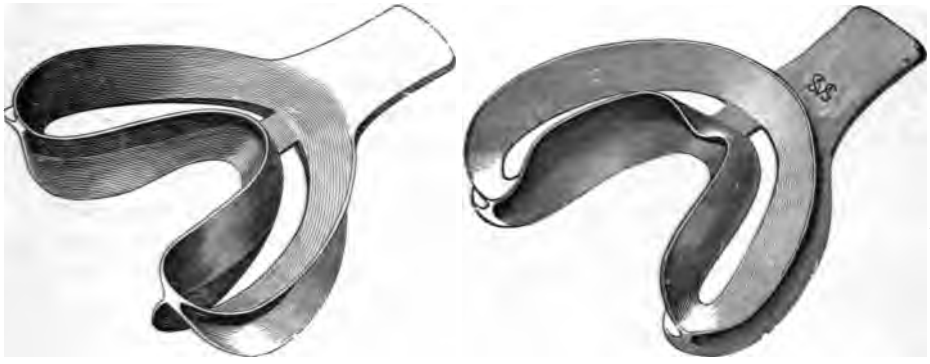
principal point to be observed in this method is expedition. After placing the wax in the tray, the plaster, mixed with warm water, in order not to chill the wax, should be placed in the tray, and introduced into the mouth as quickly as possible, while the wax is in a plastic condition.

The wax takes the impression of the teeth very kindly, and the plaster gives a perfect impression of the whole palatal surface.

Dr. B. W. Franklin's trays for plaster impression of the inferior jaw.

Dr. B. W. Franklin devised a tray for taking impressions of the inferior ridge. This tray, or rather double tray, has an opening all the way round, except a narrow bridge at the front. The advantages of the opening are that when the under part of the tray is filled, and the upper part one-fourth full of plaster, and placed in position over

Top. Bottom.



the ridge, the operator with the end of the finger can force the plaster into the under tray and secure a perfect impression.

Dr. A. G. Bennett's suggestion in difficult partial cases.

For difficult partial cases Dr. A. G. Bennett suggested the selection of artificial teeth, which are to be ground to fit in the spaces, and secured in place with hard wax. The impression is then to be taken, and, after removal, the teeth are placed in position. This method requires no articulation out of the mouth.

Dr. Charles J. Essig's method of obtaining impressions of difficult partial cases.

Dr. Charles J. Essig suggested for obtaining impressions of difficult partial cases the following plan: but it is not applicable where interdental spaces are frequent or large.

An impression-tray should first be selected of the proper size and shape, — those with the flat floor are best for partial cases (see pages 44 to 46); the plaster should be mixed thin, almost as thin as water, adding salt to facilitate setting. Now oil the tray, so that it will readily separate from the impression when hard; fill the tray as soon as the plaster thickens sufficiently; then, with a small spatula, place a layer of the soft plaster upon the palatal surface of the mouth; otherwise by inclosing the air in the deep portion of the arch the accu-

racy of the impression may be impaired. After this precaution the tray is placed in the mouth, and gently pressed up until its *floor comes into contact with the teeth.* When the plaster is sufficiently hardened, remove the tray—which, from its having been oiled, is done without difficulty. With the thumb and index finger break off the outside walls. The portion covering the palatal surface is then removed by the use of a blunt steel spatula, curved at the end in the form of a hook. The pieces are then placed back into the tray, where they will be found to articulate with perfect accuracy.

Dr. S. E. Gilbert's plan in lower cases.

For taking a partial lower impression, where the teeth are elongated or loose, or lean in different directions, Dr. S. E. Gilbert advises to first obtain an impression in wax and make a plaster model; then fit wax caps over the crowns of the plaster teeth, extending almost to the gums. These wax caps are to be removed from the model, and placed upon the natural teeth, and an impression taken in plaster as usual.

Dr. J. B. Bean's recommendation.

The late Dr. James B. Bean, of Baltimore, recommended that a wax impression should be taken, from which dies must be prepared; a metallic plate swaged, on which from ridge to ridge a strip of metal should be soldered. Between this and the plate he passed a stick, to serve as a handle in removing the impression. Then, after heating the plate, he coated the palatal surface with shellac, and upon this placed a thin layer of raw cotton, which, adhering to the resin, and permeating the plaster batter, when poured on, prevented the thin impression from breaking up into fragments.

Cotton to prevent fractures in partial impressions.

Professor P. H. Austen's gutta-percha tray and its uses.

Prof. P. H. Austen designed a gutta-percha tray which is thus described: Take a wax impression and make a model; in partial cases, brush over the teeth of the model one or two layers of thin plaster, to fill up all undercuts, and to make the plate fit loosely; saturate the model with water, and mold over it a gutta-percha tray. This last is done, not by using the gutta-percha in sheet, but by first making it into a ball, then working it from the palate outward, leaving a thick mass in the center. It should be, on the inside, from one-fourth to one-half of an inch thick, so as to be stiff and unyielding; but on the outside not more than one-eighth or one-sixteenth inch thick, so as to be slightly elastic and yielding. The whole inside of the tray must be roughened up with a scaler or excavator, in such a way that the plaster can take firm hold. In most partial cases, the impression will have to be removed in sections; the inside remaining entire, but the outside and the parts between the teeth coming away separately. In certain cases, it is necessary to partially cut through the tray before putting in the plaster, and usually upon the thick masses of gum which fill the interdental spaces. A cut on the inside, in line with the ridge, gives pliancy to an otherwise rigid tray, and permits its easy removal. When it is desirable to extend the tray around the entire arch, so as to get

an exact plaster impression, not only of the gum but of all the remaining teeth, this rim of gutta-percha must be slit at two or three points, to give that pliancy which is a chief merit in this form of tray. These trays have no handle, but are removed by inserting a plugging instrument into a small hole previously made in the back part of the tray where it is thickest.

Dr. Horace Dean's method.

Dr. Horace Dean describes a method of taking an impression of a partial upper case substantially as follows :

For partial upper cases.

Take a correct wax impression. In this cast a plaster model. Separate as soon as set. On the model place sheet wax to cover all the portions of which a copy is desired, including the palatal surface, but not the grinding-surfaces, of the teeth. In the spaces between the teeth let the wax be quite thick. Over this wax plate carefully adapt a piece of wire mosquito-netting so that it touches the wax and the grinding-surfaces of the teeth. Coat with glycerol the parts of the model not covered with the wax. Pour a coat of plaster over the wax and net, covering the grinding-surfaces of the teeth and a narrow space behind the wax plate. When hard, separate and remove the wax. Try the shell in the mouth, and trim so that it goes easily into place and rests firmly on the ends of the teeth. Soak this shell in water, and fill with plaster mixed as usual. Place in the mouth, and press until it rests on the teeth.

For full upper cases.

For a full upper case take the impression in wax, and make a model. Mark on the model places where the shell can rest firmly. Construct the shell as before described, and take the plaster impression.

For partial lower cases.

For a partial lower case proceed as before, except leaving a portion of the wire net, just back of the front teeth, uncovered by plaster. This forms a hinge which permits the free ends of the shell to be pressed toward the tongue, thus carrying the plaster past the teeth until the shell is in place. The wings may then be pressed against the teeth and so held until the plaster has set, when, if necessary, the wings may again be pressed inward, breaking the impression at the hinge with a clean fracture, which serves as a guide to correct restoration.

Dr. S. H. Guilford's method.

A method recommended by Dr. S. H. Guilford is to place pieces of wax on the tray at points corresponding to the natural teeth remaining in the mouth ; then, keeping the wax warm and plastic, fill the remainder of the tray with plaster.

Dr. J. F. Leaming's method of plaster impressions without tray.

Dr. J. F. Leaming proposed a method of taking upper impressions with plaster without a tray :

After carefully examining the mouth, mix a sufficient quantity of plaster to the consistence requisite to pour into a mold, adding a little salt, if necessary, and stirring constantly, until it gives evidence of

setting. Care should be taken not to delay too long, as better results are obtained while the plaster is quite thin. Distending the mouth slightly with the left hand, introduce the plaster quickly, but not hurriedly, upon the point of the spatula, first covering the arch until overfull, then upon the buccal aspect of the gum, beginning posteriorly on both sides, and finishing anteriorly, pressing the plaster carefully to the gum, in front, with a napkin. Remove, by first pressing the impression at the sides carefully downward. If any portion of the rim is imperfect, trim down as far as needful, wet the impression, reapply it to the mouth, and build up with fresh plaster.

When the gum in front is soft and flabby.

For a full case, where the gum in front is soft and flabby, it has been recommended to use soft wax for a first impression, making the wax adhere to the tray; when cold, cutting a deep groove, into which the softer portion of the gum can depend, leaving the waxed ridge quite high all around, and if the roof is hard, having the wax sufficiently high at that point to press it gently. The plaster should be as stiff as can be used without pressing the soft tissues out of place.

Dr. F. C. Green's narrow tray for lower impression.

Dr. F. C. Green, for a full lower impression, recommends a very narrow tray,—one not much wider than the alveolar ridge; the tray to be filled with quick-setting soft plaster. After removing the tray from the mouth, the edges are to be trimmed, and a thin layer scraped from the entire surface, especially under the tongue. The impression is then to be thoroughly soaked in water, filled with plaster not thicker than cream, and replaced in the mouth with gentle pressure, care being taken that the tongue is raised and that the muscles are not impinged upon.

Dr. C. S. Chittenden's method of making a tray for special cases.

Dr. C. S. Chittenden recommended the following plan for making a tray for special cases: First take an impression in wax and draw a cast from it; then take a piece of sheet lead and fit it to the cast as nearly as possible, by rubbing down with burnishers, something like a trial plate, leaving it a little higher on the edges than a plate which is to be worn would bear to be. Use this lead pattern or trial plate for an impression-tray; but as it would not be stiff enough to answer that purpose of itself, punch some small holes through the lead, and pour plaster of Paris over the whole lingual surface, letting it run through the small holes in the lead, so as to bind the plaster firmly to it in the same way that mortar is bound to the lath on walls and ceilings. When the plaster has set, cut away all that will be in the way, and having prepared the plaster for the impression, pour it into this made-up tray, and, putting it into the mouth, press it home in the usual way.

Dr. Stewart J. Spence's method where inwardly inclining teeth remain.

For partial cases where the remaining teeth incline inward, Dr. Stewart J. Spence cuts from the selected tray its buccal flanges as far

forward as the cuspid portions, and slits the vault-part nearly to the labial flange, so that the two wings can be readily conformed to the width of the arch and to the depth of the vault. Pulverized potash-alum is added to the plaster, which is mixed moderately thick and piled on the vault part of the tray, extending to its front flange. The fingers can be used to press the plaster with the tray into the vault, while the protruding plaster is all scraped from the buccal cusps and surfaces of the bicuspids and molars. When the plaster has been given time to become very hard, it is cut from the grinding-surfaces of the bicuspids and molars so that these may, by the index finger wrapped with thick rubber-dam, be successively forced outward and so loosened from the plaster that it may be readily removed with the tray.

Dr. George F. Reese suggests the following method for special cases:

Dr. George F. Reese' reservoir idea.

Cut a hole through the floor of the tray, and over this place sheet wax, and with the same material make a shallow cup or reservoir on it; on the flange and across the palatal edge of the tray form a rim of wax. After the introduction of the tray, the plaster in the reservoir can be manipulated with the finger, forcing it up into the arch.

For partial sets, melt wax over the tray. Add softened wax to take an accurate impression. Cool this in water and cut away the wax wherever the plaster is specially desired to go; rim the cavities with sheet wax to form reservoirs. After trial in the mouth, fill in with plaster, taking care to have the reservoirs full, but no plaster in the impressions made in the wax by the teeth.

It is sometimes advisable to take a preliminary impression in modelling composition, cut a groove across the palatal part of the impression, and from the groove raise a wall of soft modelling clay. Then gloss the surface of the compound over the spirit-lamp flame, spread an even coating of soft mixed plaster, and take the impression as usual. The soft clay will not disturb the palate, yet will perfectly prevent the passage past it of the plaster.

Preliminar impression in modellin composition.

Dr. W. S. Payson suggests the following method of making an extension to an impression-tray:

Dr. W. S. Payson's extensio to impre sion-tray

Take a strip of thin sheet lead or tin and shape it to fit the rear floor and come around on the sides of the tray, flaring backward and standing as high as desired. Drill holes through the strip and tray, and sew them together. The plaster will thus be prevented from overflow into the fauces. By simply cutting the threads the tray may be restored to its original form, and be ready for another like modification to meet any peculiar case.

Dr. B. F. Rosson suggested the following plan of taking impressions:

Dr. B. F. Rosson's plan.

mpressions only of the parts where the plate rests.

The principle consists in obtaining an impression only of the parts upon which the plate is to rest; this is done by using for the lower jaw a very narrow impression-tray, and almost flat instead of deeply concave, as they usually are. This may be bent so as to partake as nearly as possible the form of the ridge of the jaw. A sheet of softened wax is then put upon the tray, and pressed upon the jaw till a good impression is secured; then trim down the wax just to the size the plate is to be; now use this for the plaster impression-tray; a very small portion of plaster properly prepared will be sufficient to obtain a very perfect impression. The plaster should at no point be permitted to pass much beyond the proposed border of the plate; this is to prevent pressing and distending the soft tissues on both sides of the ridges; such distention usually draws the mucous membrane of the gum out of position. Immediately after the tray with the plaster is placed on the jaw, the tongue should be raised above the tray and kept there till the plaster has set.

The tray for the upper jaw should not extend much beyond the ridge all round, so that the same principle is observed as described for the lower.

)r. L. E. Custer's difficult upper partial cases.

Dr. L. E. Custer adopts the following method in taking an impression of a difficult upper partial case:

With a spatula bent the required shape, carry plaster of Paris of proper consistence to the roof of the mouth, and spread it as far back as necessary, adding more plaster until even with the necks of the teeth, leaving the exposed surface rough. Then with modelling composition take an impression over the hardened plaster, to which the composition will adhere, thus securing the advantages of both materials,—the plaster for the mucous membrane and the composition for the teeth.

The following method of obtaining an impression for an exceedingly difficult partial lower case has been described:

road jaw with contracted mouth and bulbous, inclining teeth.

The mouth offered serious obstacles to the procurement of a correct impression,—a broad jaw associated with a contracted oral opening; a cuspid and a molar, upon either side, which, inclining toward each other, inclosed interdental spaces of dovetailed form; the teeth of that bulbous configuration consequent upon an extensive absorption of the supporting structures. All of the customary plans for obtaining a cast were employed without success, but a satisfactory model was finally secured by the following process:

An impression in wax was first taken, from which the plaster cast was made, and the teeth removed as usual; but before imbedding in the sand the entire surface was evenly covered with sheet wax one-eighth or one-fourth of an inch in thickness. When the metallic models were made, a plate of ordinary tin or tinned iron was struck for an impression-tray; perforated to permit the teeth to pass through,

and a handle soldered to stiffen the appliance and facilitate its introduction into and withdrawal from the mouth. The tray so constructed was adjusted to freely slide over the remaining teeth, its interior *thoroughly oiled*, and small pieces of wax placed over the apertures to prevent the batter from escaping while inverted. Thus filled, it was placed in position (the teeth readily displacing the loosely applied wax over the openings), and allowed to remain until the plaster had sufficiently solidified, when it was removed, leaving the hardened plaster to be carefully extracted in sections and replaced in proper position in the tray.

The success of this method will be largely, if not wholly, dependent upon the use of a *stiff* and *unyielding* cup, which shall not bend or spring from the application of the requisite force.

Full impressions for metal dies

For a full impression in which a metal die is to be cast, mix one-third of either fine sand, marble-dust, whiting, or pulverized quartz, with two-thirds plaster. Slowly and thoroughly dry the impression, and pour the metal into it at its lowest melting point. This plaster compound is also useful in difficult cases where an impression should be allowed to get quite hard prior to removal in easily broken sections.

Make model cast before the impression becomes too dry.

The model should be taken before the plaster impression becomes dry, having previously coated it with something to prevent the adhesion of the plaster,—a solution of soap, a thin wash of collodion, or sandarac or shellac varnish. The solution of soap is made by adding an ounce of white Castile soap in powder or shavings to a pint of water, and heating it until the soap is dissolved. It should then be bottled, and poured out as needed for use, avoiding using it from the bottle, as it is rendered turbid by contact with a brush that has been used on plaster. Soap is best on a very moist impression ; collodion or varnish on one partly dried. If the impression has become very dry, it is necessary to saturate it with water before pouring the plaster for the model. If varnish is used, oiling the surface after it becomes dry will insure the separation. The later plan of varnishing the impression with an alcoholic solution of sandarac or shellac is strongly advocated, as the coloring matter by penetrating a short distance affords a guide in separating the model, and thus diminishes the liability to fracture or mutilate the cast,—an accident often occurring when there is no line of demarkation, and one is obliged to rely upon his mental outline of the case. The water with which the plaster is mixed for taking an impression is sometimes colored for the same purpose by the use of a few drops of a solution of carmine or anilin, or by the addition to the dry plaster of a small quantity of Venetian red, Spanish brown, burnt umber, cochineal, indigo, washing-blue, or vermilion. Enough of either to answer the purpose is not detrimental to the plaster, and gives it an appearance pleasant to the eye of the patient.

Coatings for plaster casts

Coloring impressions

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IMPRESSION TRAYS.

The original set of these Britannia Impression Trays were designed especially for the late Dr. S. S. White in 1871. From time to time since, additional forms for special conformations and conditions, and for partial work, have been added, as the need for them was developed, until now the line affords the means for taking any impression likely to be met with in practice.

All our Impression Trays are made of britannia-metal, of the best quality, and of uniform thickness. They are light enough to allow of alteration with pliers or mallet, or for many cases with the fingers, so as to adapt them to any peculiar formation of the maxilla. They are superior in form and finish.

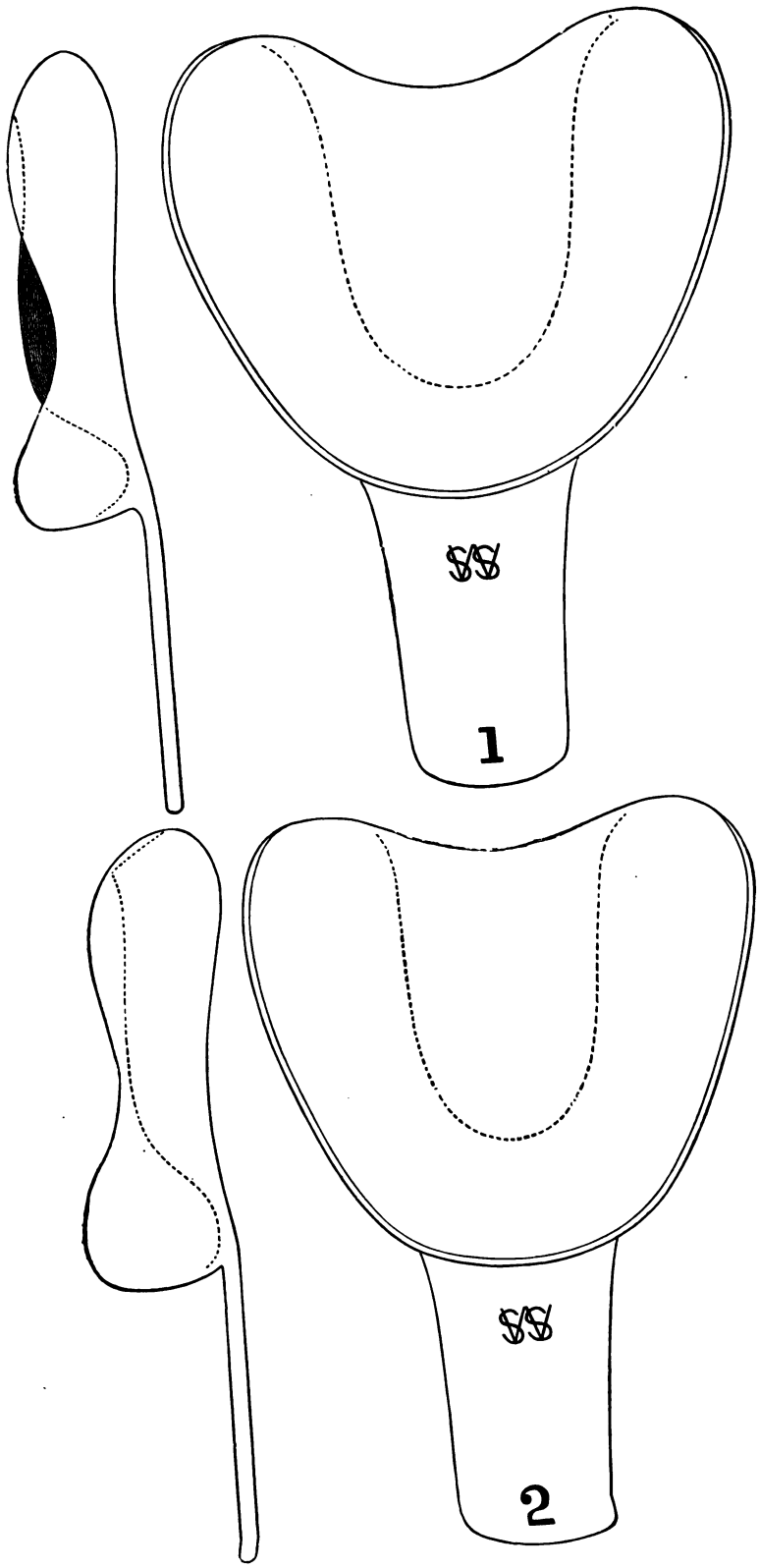
UPPER IMPRESSION TRAYS.

FORM A.

Form A illustrates the shape of a set of eight, Nos. 1 to 8, for Full Upper Dentures. Special attention is invited to the peculiarities of these forms, which we introduced many years since,—to the dip at the sides, to accommodate the prominences of the malar processes, and in front to avoid the labial frænum; and to the length (1½ inches) and position of the handle, which, being below the line of the base, gives more room for the lip.

The exact size of each Tray of the set is outlined, with its number, by which it may be ordered. The side views show, by the dotted lines, the height of the palate portion of the Tray.

Price, Upper Trays, Nos. 1 to 8 . . . . . each 25 cents.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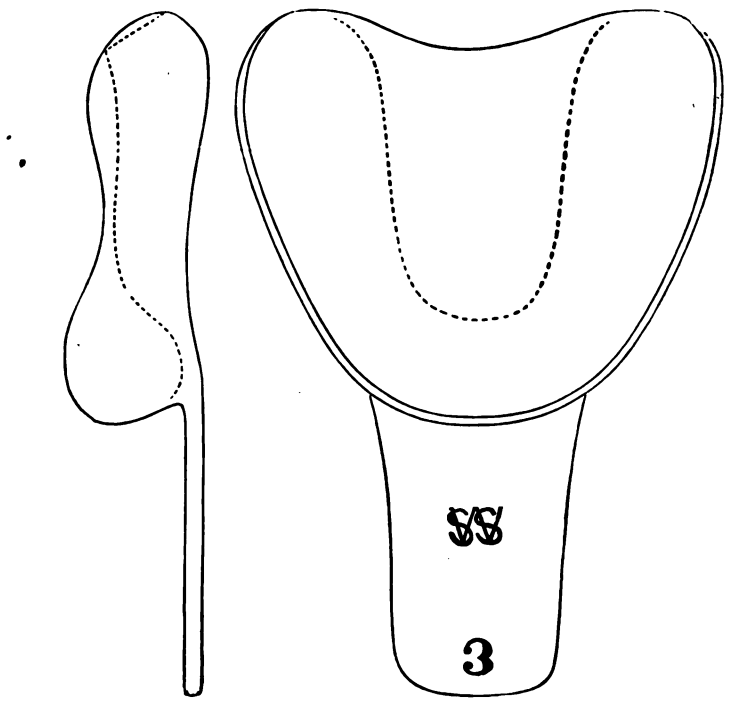
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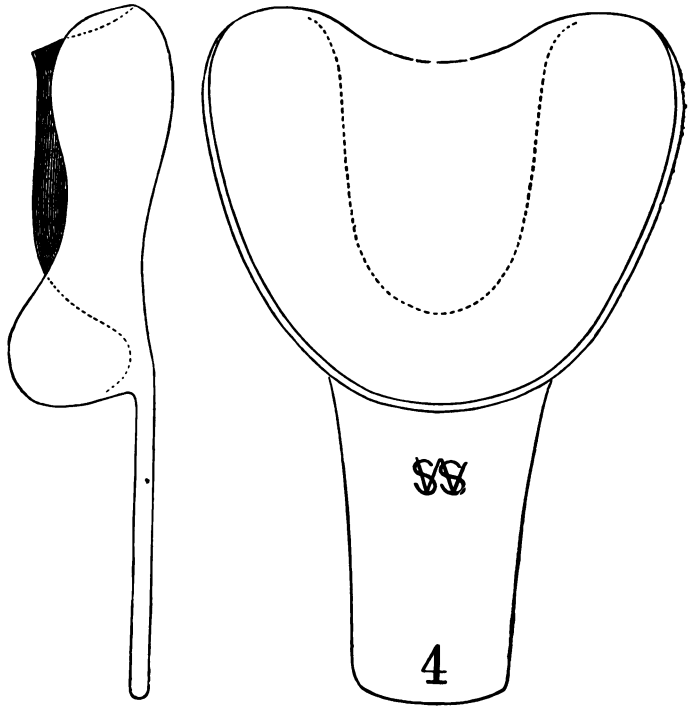
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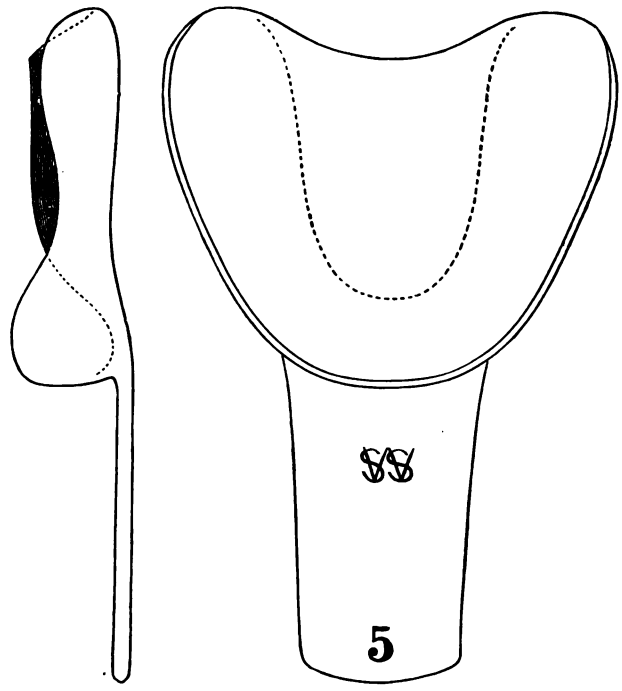
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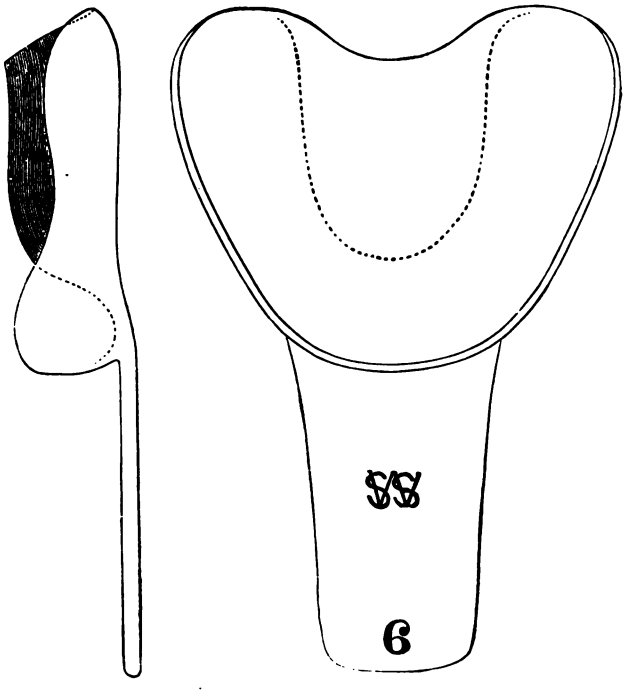
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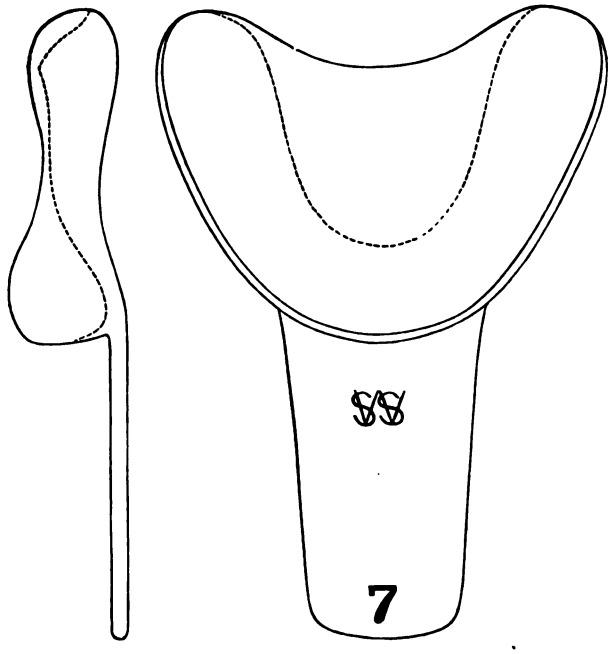
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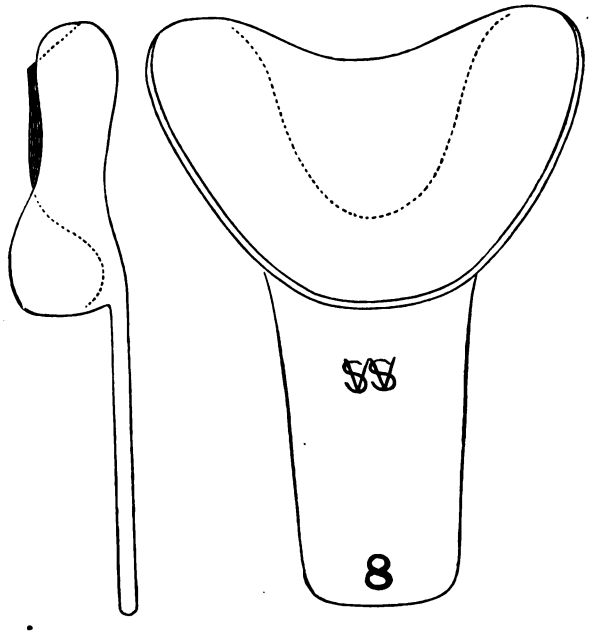
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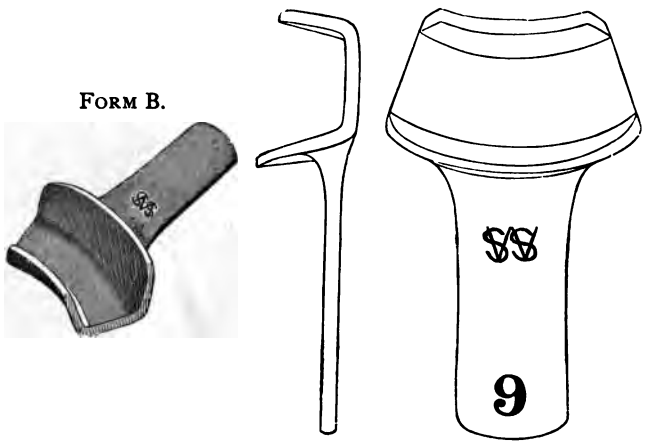
PARTIAL UPPER TRAYS.

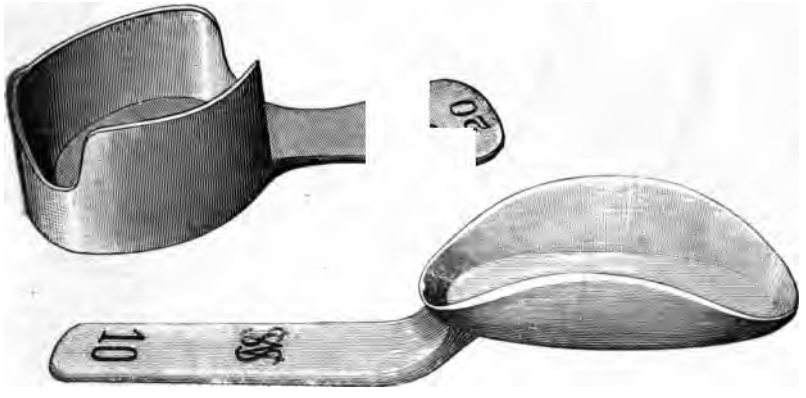
Form B illustrates a Partial Upper Tray for one or two teeth. Useful in investing and bridge-work. One size.

Price, Upper, No. 9 (Partial) . . . . . 20 cents.

FORM B.



PARTIAL UPPER OR LOWER TRAYS.



No. 10 suggested by Dr. L. M. Mathews; No. 20 by Dr. Geo. W. Melotte. These Trays were designed for Partial Cases of every description. They are well adapted for use in any part of the upper or lower jaw.

Price, Partial, Nos. 10 and 20 . . . . . each 25 cents.

UPPER IMPRESSION TRAYS.

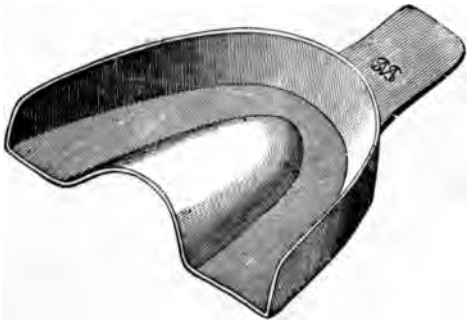
With Flat Bottom and Square Sides.

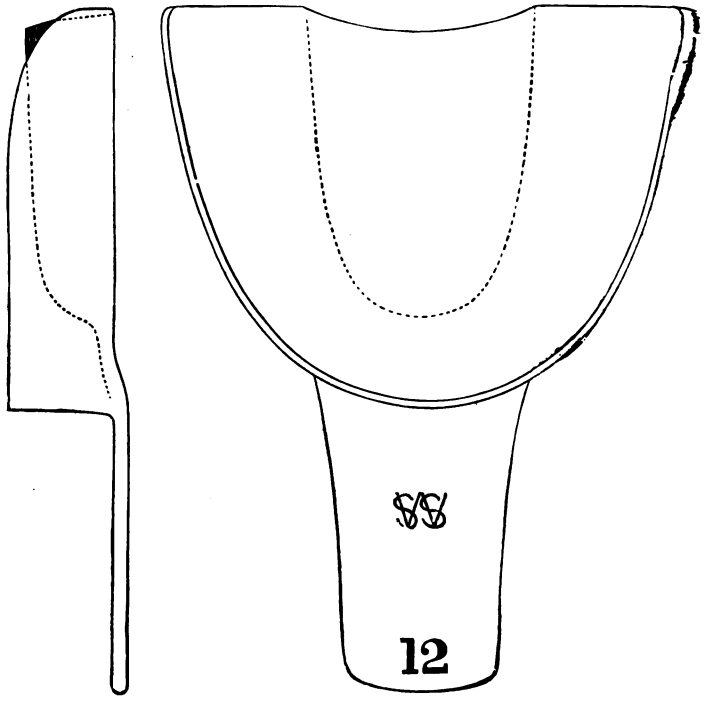
Form C illustrates the shape of a set of five, Nos. 12 to 16 (for Pa Upper Dentures), with flat bottom and square sides; the handles, 1½ in in length, set below the line of the base.

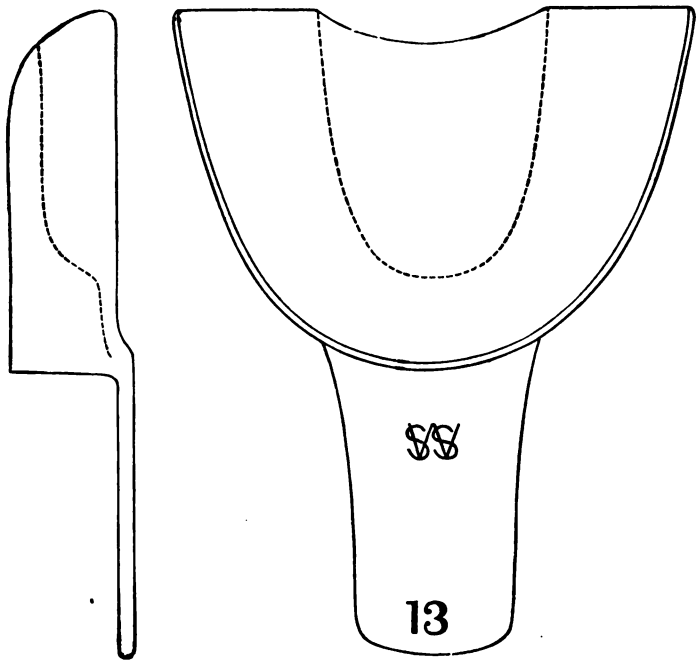
The exact size of each Tray of the set is outlined, with its number, by wl it may be ordered. The side views show, by the dotted lines, the heigh the palate portion of the Tray.

Price, Upper Trays, Nos. 12 to 16 (Flat Bottom) . each 25 cents.

FORM C.



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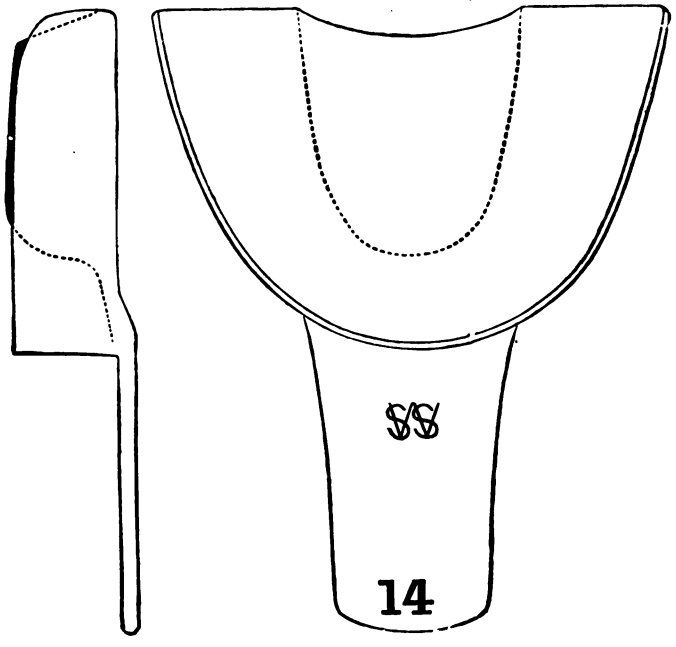
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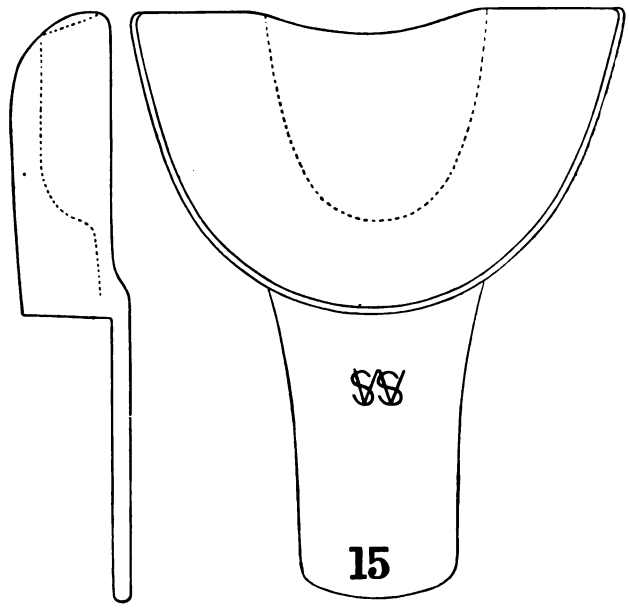
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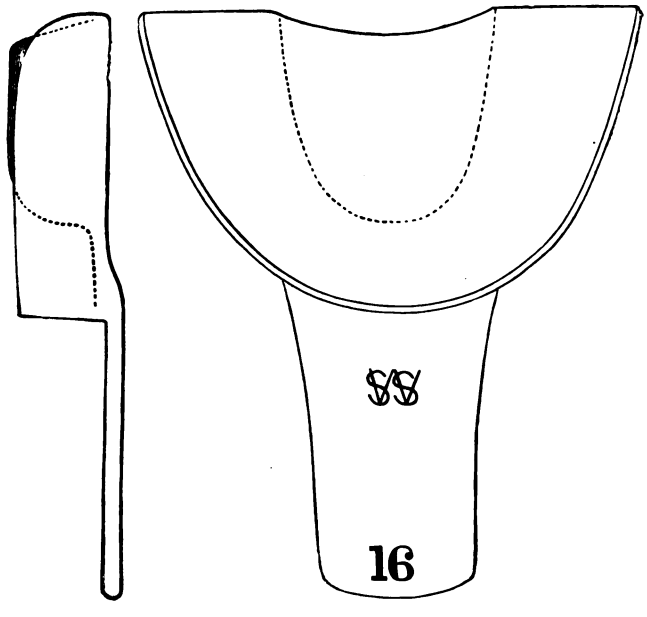

16

ADJUSTABLE UPPER IMPRESSION TRAYS.

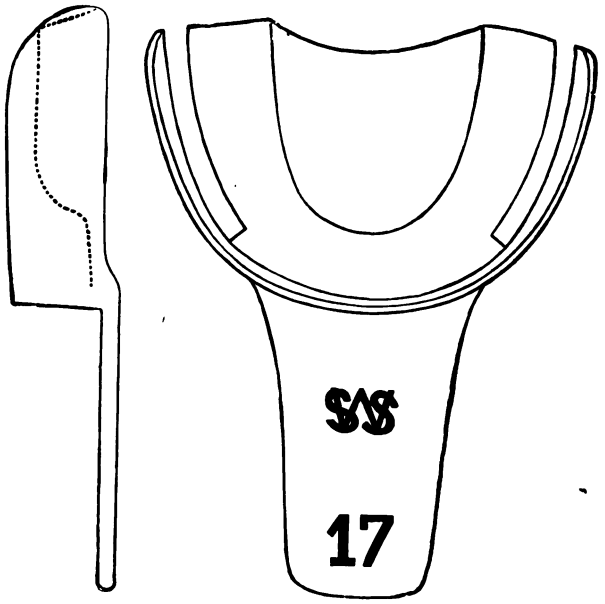
Patented August 24, 1886.

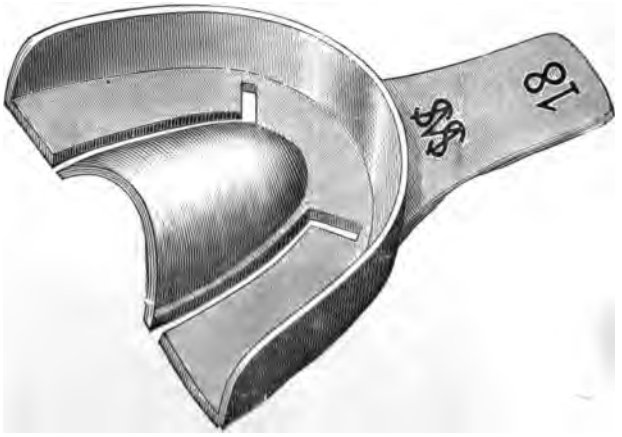
In taking impressions of deep, narrow mouths, or where a masticating tooth standing alone widens the jaw at a particular point, it is sometimes desirable to be able to readily adjust the size and shape of the Tray used.

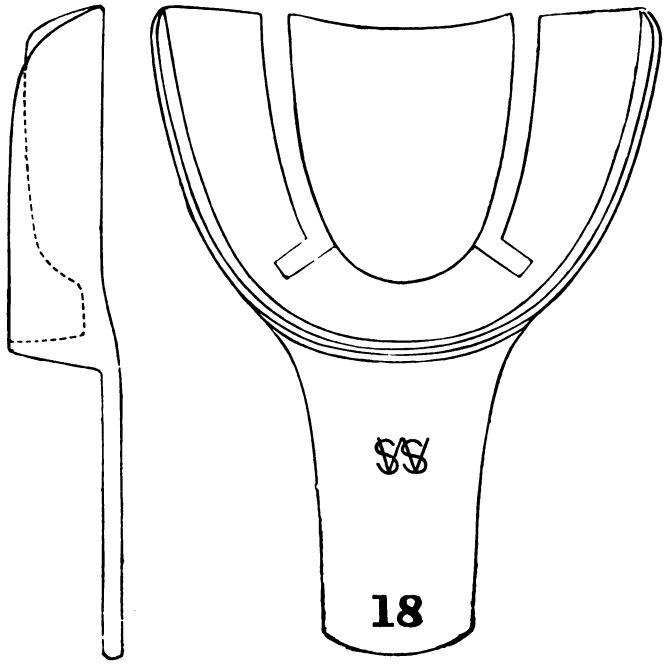
Nos. 17, 18, and 19 were designed to meet this want. In No. 17 the side walls are cut free from the bottom, and in Nos. 18 and 19 (suggested by Dr. J. K. Wiley) the palatine portion is cut free, with slots running across the bottom toward the rim, for easy adjustment.

Each of these Trays is stiff enough for ordinary uses, yet can be quickly bent, compressed, twisted, or cut away to meet emergencies or unusual presentations of the teeth, gums, or palatine arch. Their great facility of adjustment renders good impressions possible in difficult cases without loss of time.

Price, Upper Trays, Nos. 17, 18, 19 (adjustable) each 35 cts.



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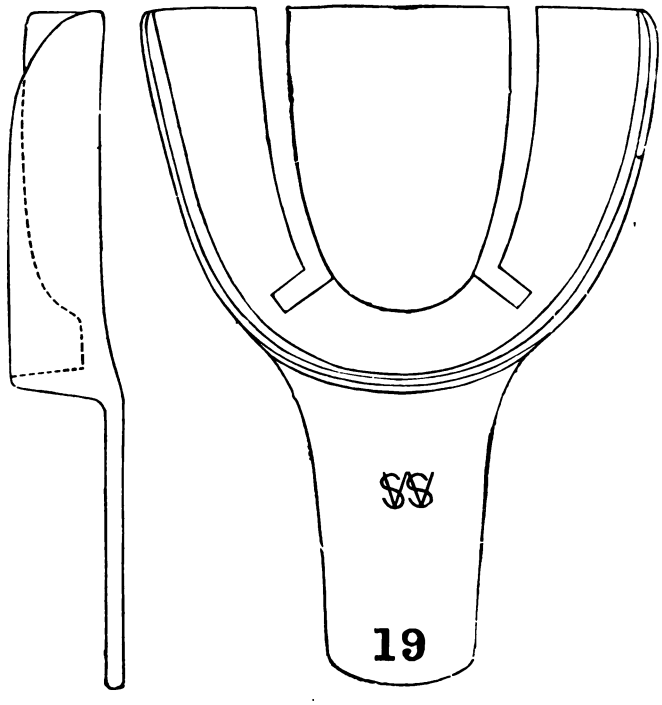

19

UPPER IMPRESSION TRAYS.

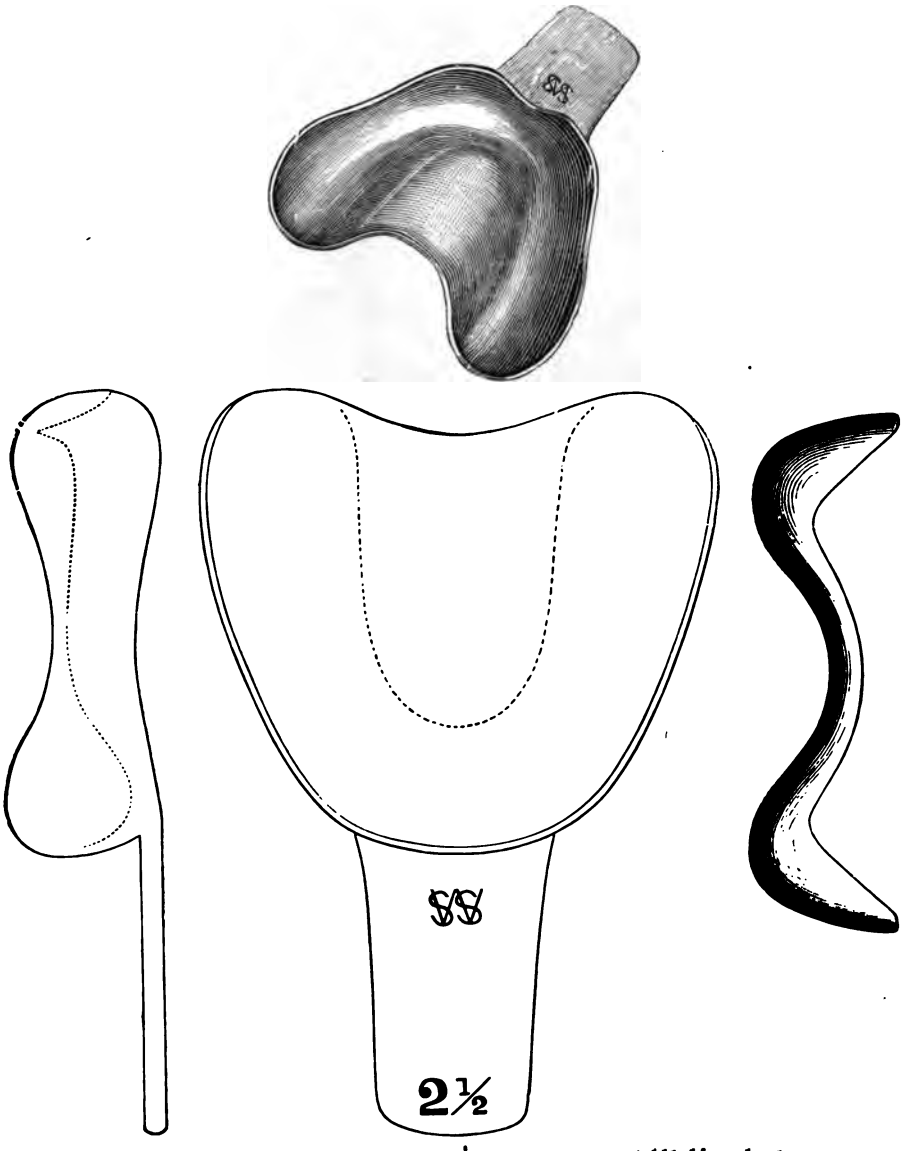
SPECIALLY ADAPTED FOR PLASTER.

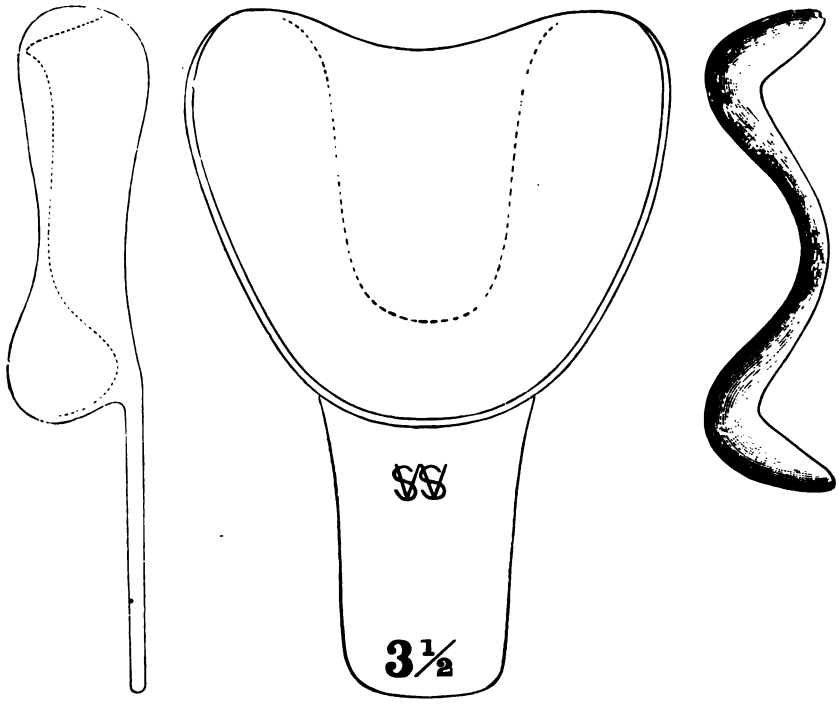
Suggested by DR. A. P. SOUTHWICK.

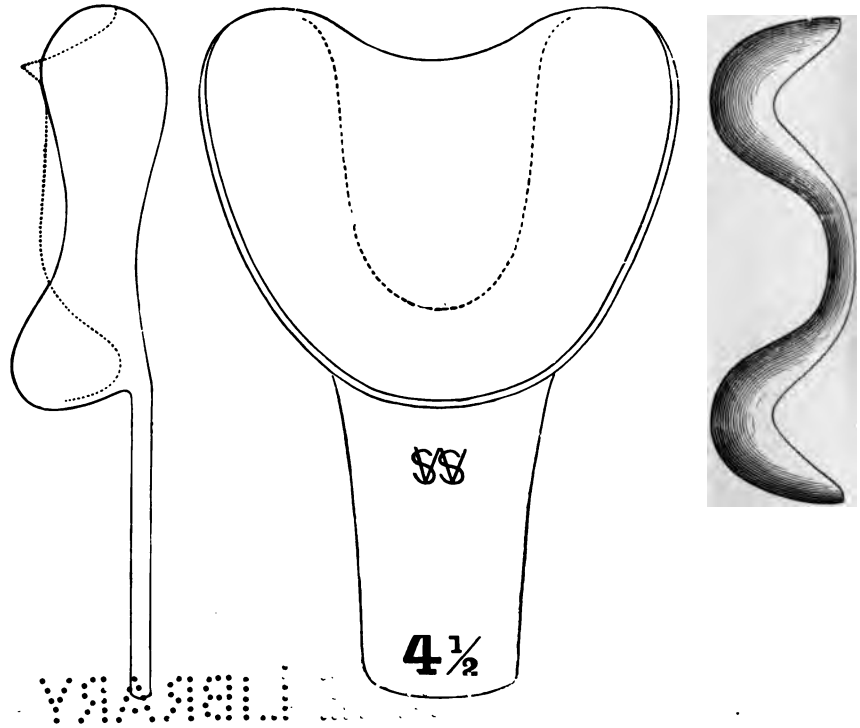
Form D illustrates a set of three, Nos. 2½, 3½, and 4½, for Full Upper Dentures, with raised palatine edges, which prevent the plaster slipping off the tray.

Price, Upper Trays, Nos. 2½, 3½, 4½ . . . each 25 cents.

FORM D.




3½


4½

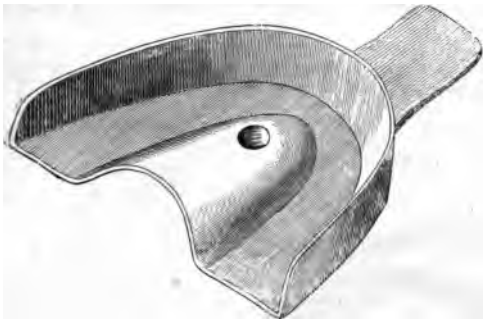
MOVABLE PALATE-PLATE TRAY.

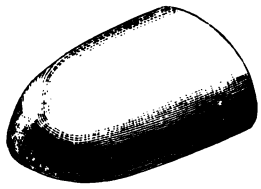
Suggested by Dr. Thomas Wardle.

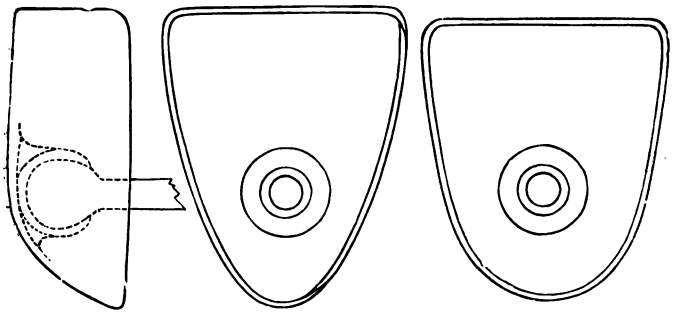
Form E illustrates the movable Palate-Plate Tray.

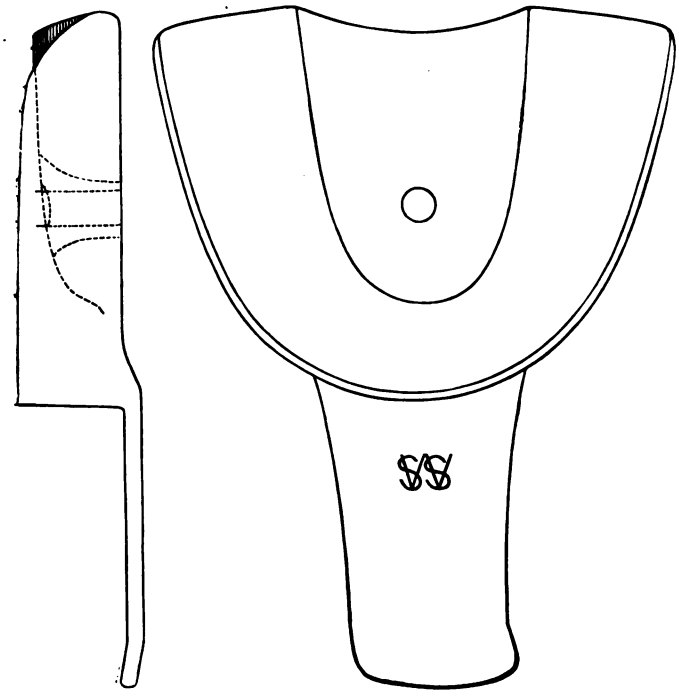
Price of Tray, with two Palate-Plates, complete	$1.00
" " " without Palate-Plate	.35
" " Palate-Pieces . . . . . each	.35

Form E.









LOWER IMPRESSION TRAYS.

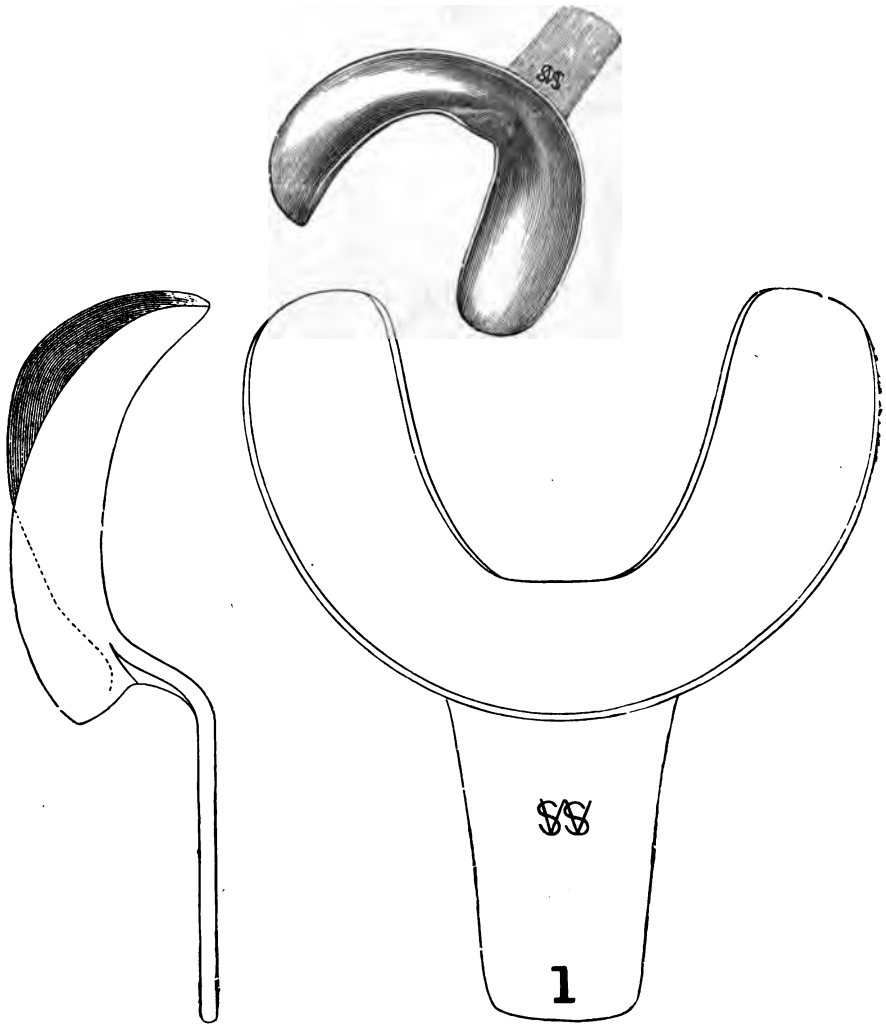
Form F illustrates the shape of a set of seven, Nos. 1 to 7, for Full Lower Dentures. The handle is 1¾ inches in length, and so curved as to raise it three-eighths of an inch above the base, giving room for the lip, and allowing the Tray to sit down well on the maxilla. The inner line is shaped to avoid the lingual frænum.

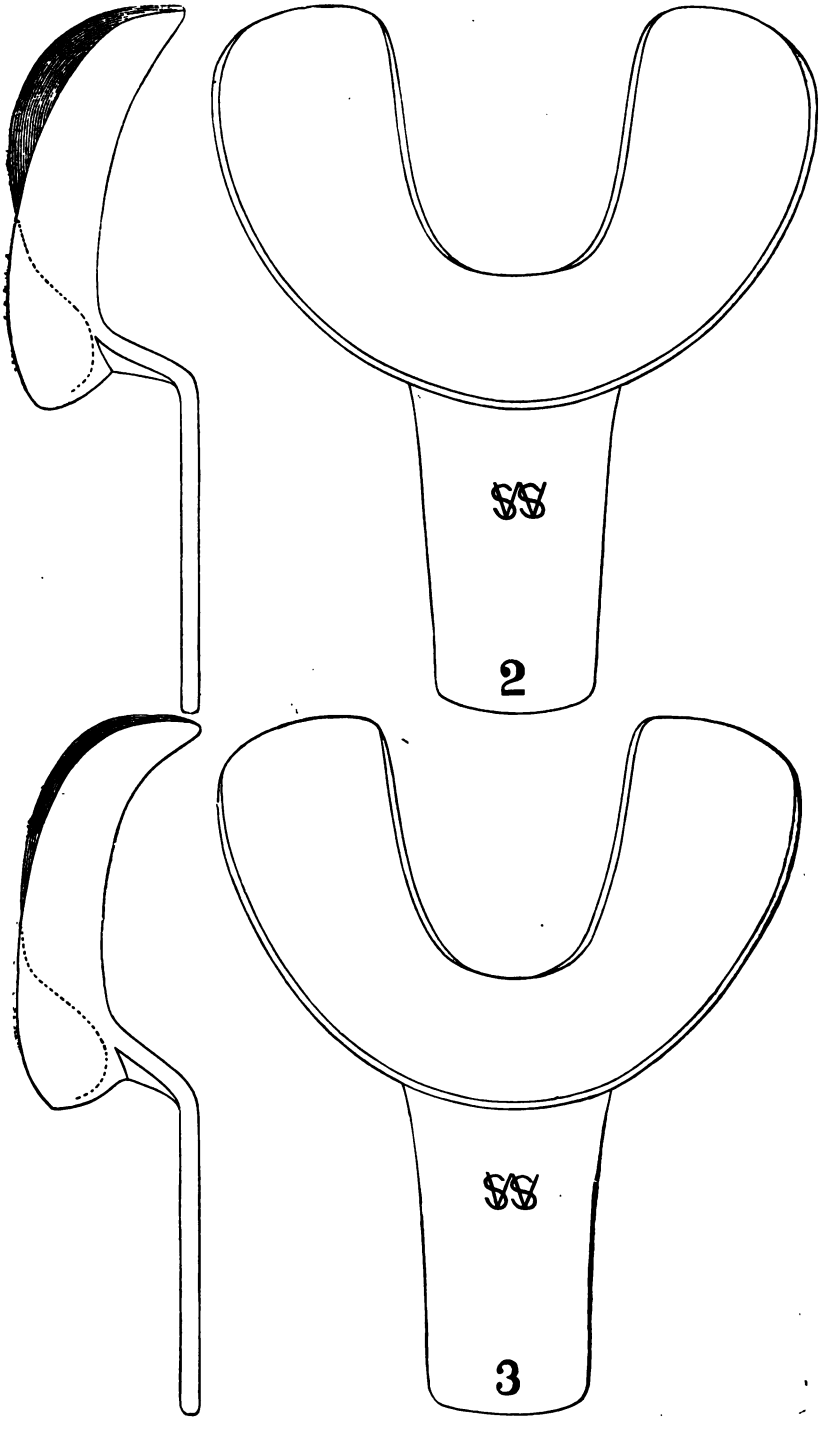
Nos. 5 and 6 are specially designed for cases where great absorption has taken place, and the muscles of the mouth are on a level with the maxillary ridge.

The exact size of each Tray of the set is outlined, with its number, by which it may be ordered. The side views show, by the dotted lines, the relative dip of the outer and inner edges of the Tray.

Price, Lower Trays, Nos. 1 to 7 . . . . . each 25 cents.

FORM F.

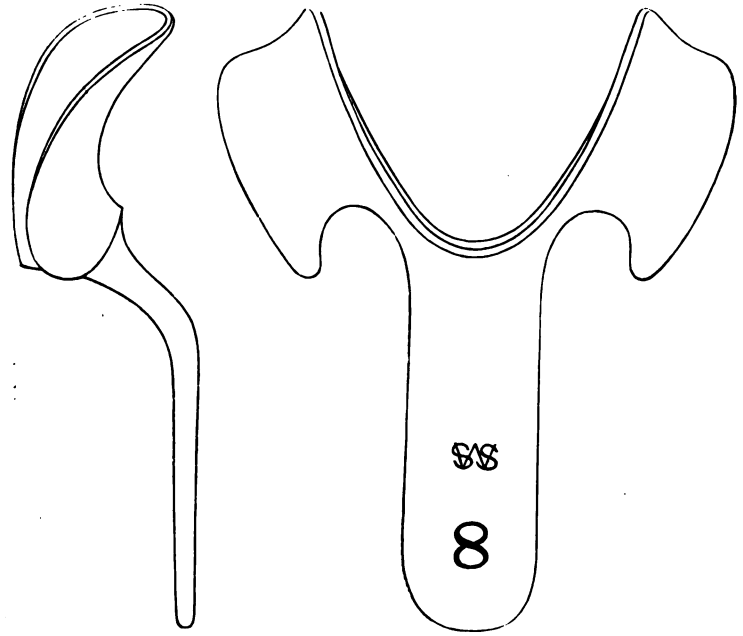


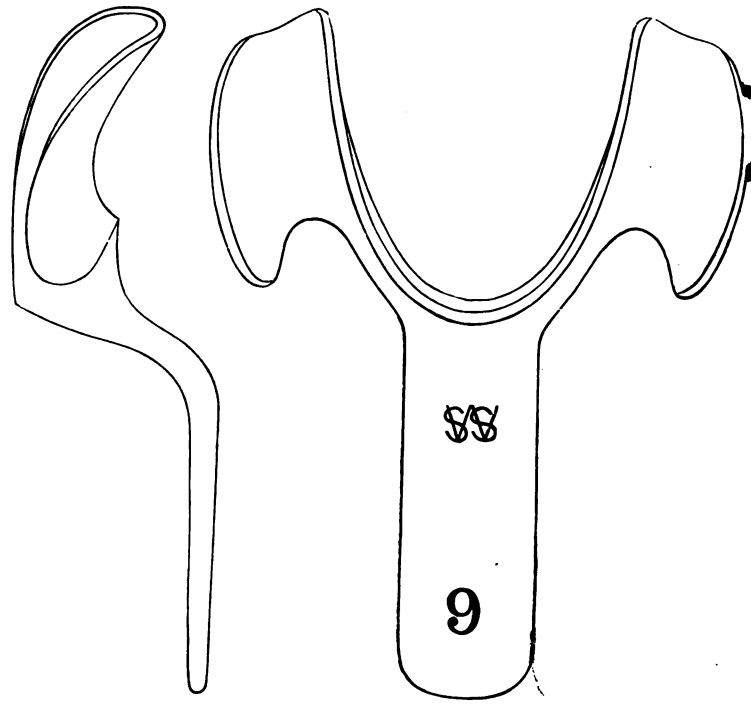

2
3

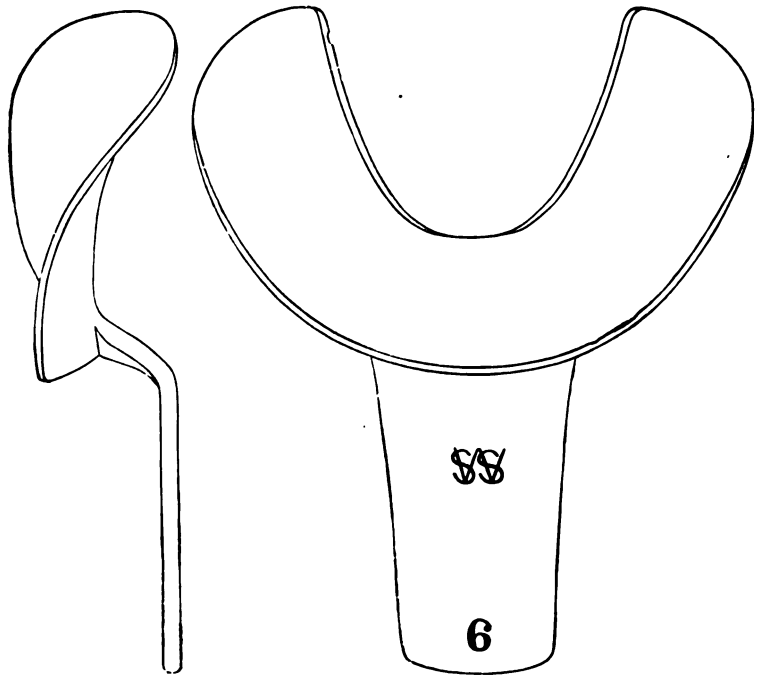
Lower Impression Trays for Undercuts.

In Impression Trays Nos. 8 and 9, from patterns furnished by Dr. C. F. Rich, the rim adjoining the handle is cut away, allowing it to be placed in the mouth with the impression-material in it, and pressed downward and forward against the front teeth, procuring a perfect impression of undercuts or shelvng gums.

Price, Lower Trays, for Undercuts . . . . . each 25 cents.



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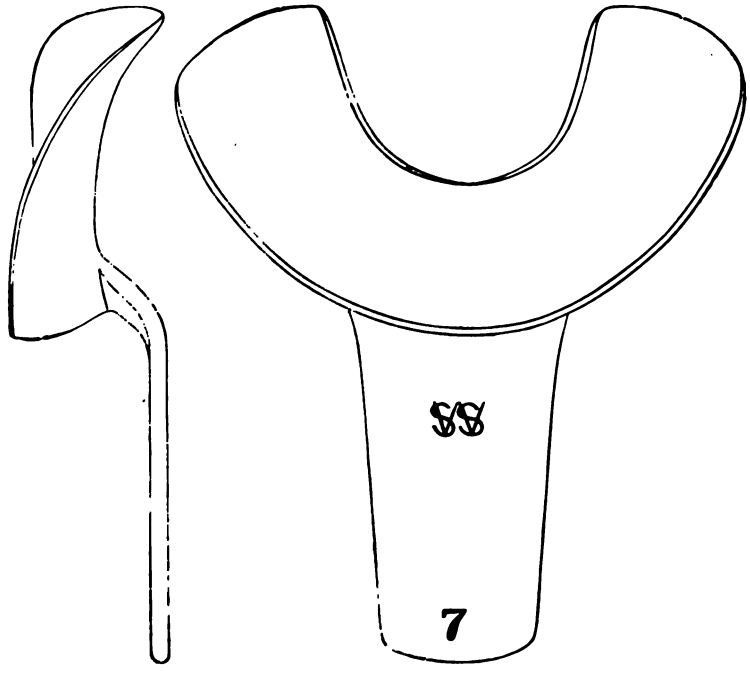
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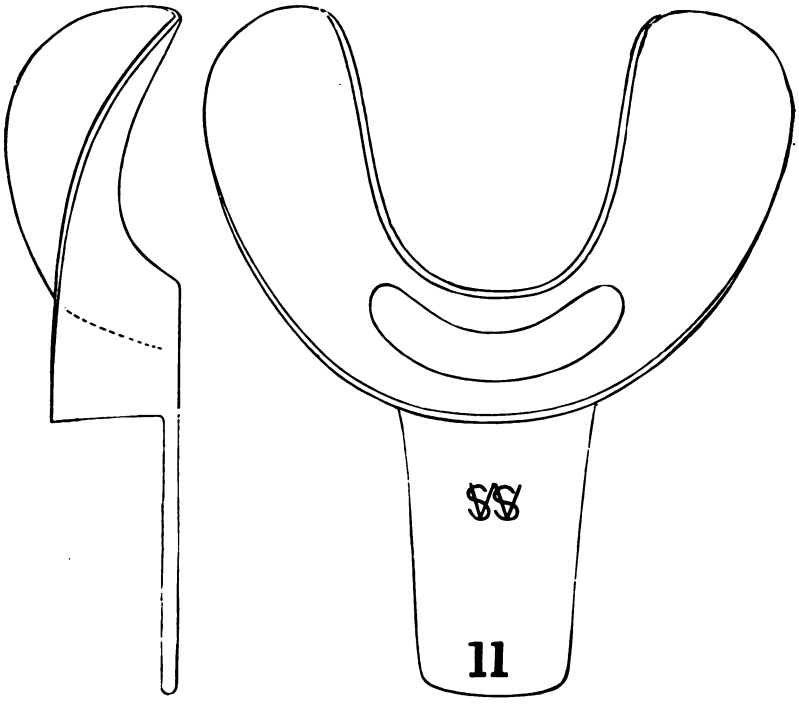
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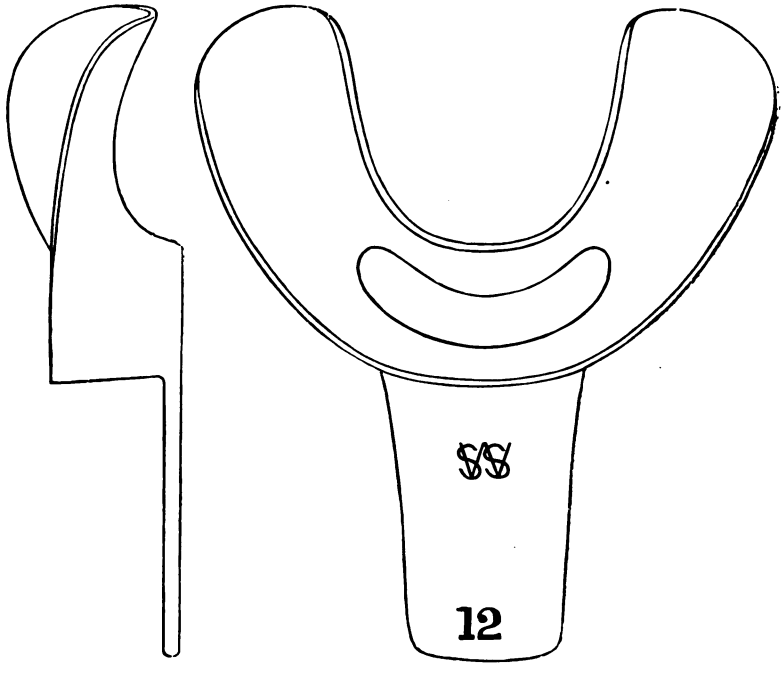
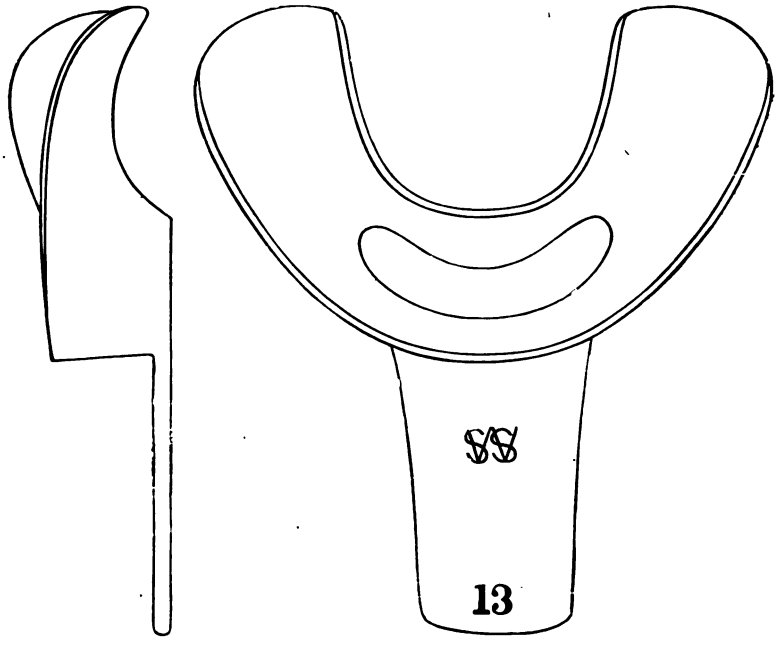

SS
12



LOWER IMPRESSION TRAYS.

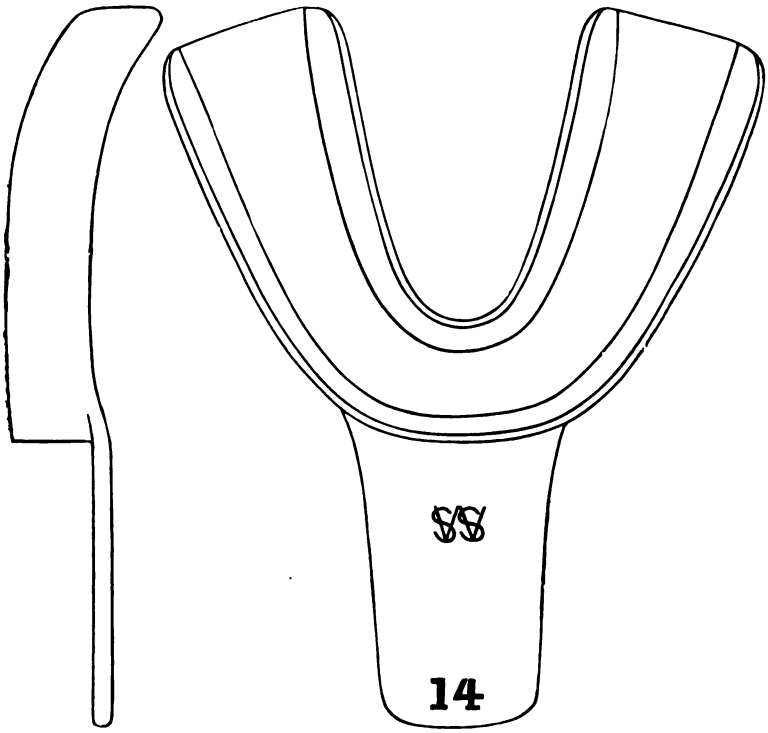
With Flat Bottom and Square Sides.

Form H illustrates the shape of a set of three, Nos. 14 to 16, with flat bottom and square sides, designed especially, in taking impressions of Lower Teeth, to obtain the antagonizing model for the Upper Dentures.

The exact size of each Tray of the set is outlined, with its number, by which it may be ordered. The side views show the position of the handle, and the height of the body of the Tray.

Price, Lower Trays, Nos. 14 to 16 (Flat Bottom) . each 25 cents.

FORM H.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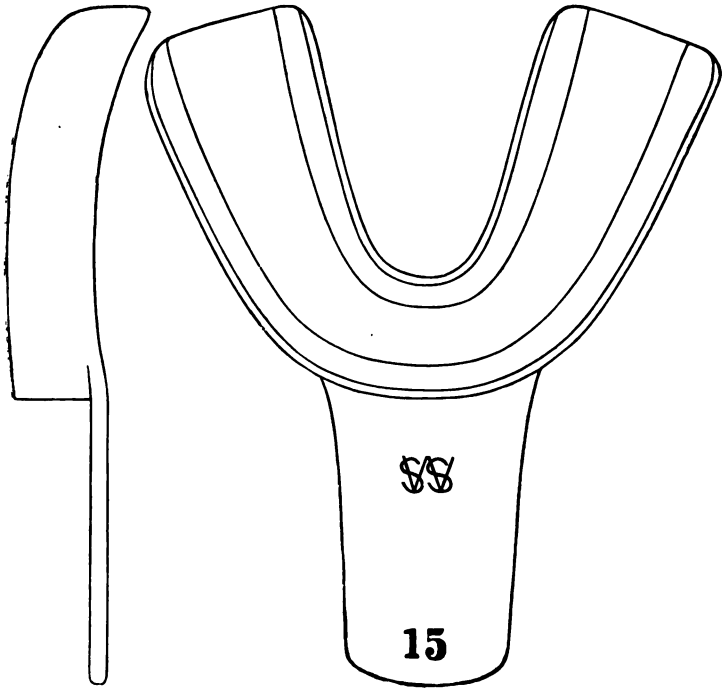
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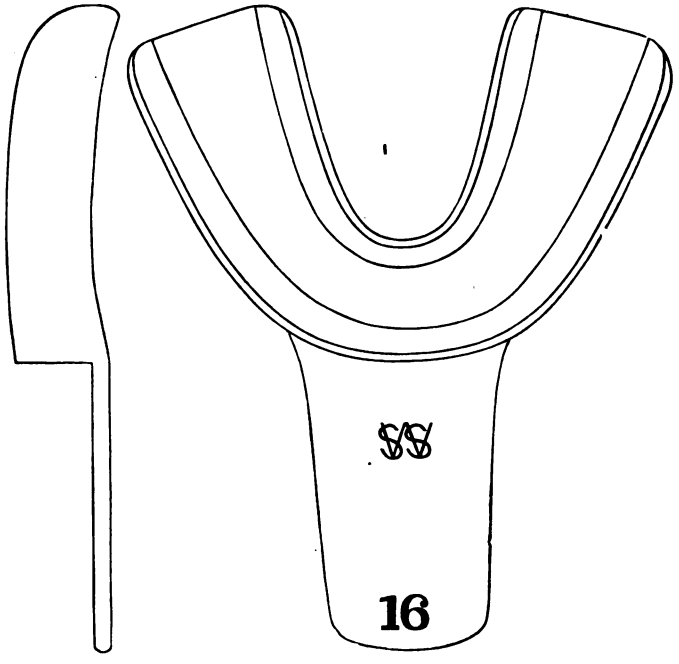
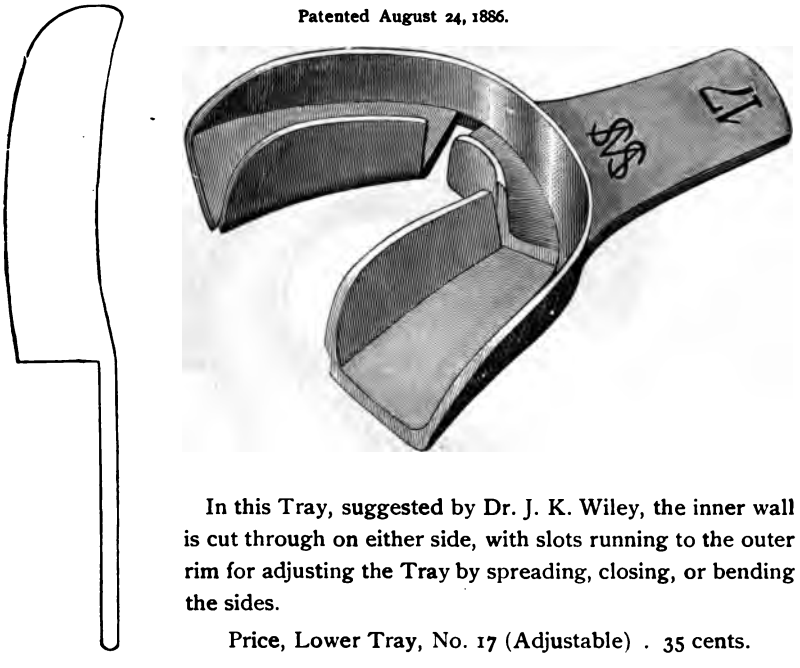


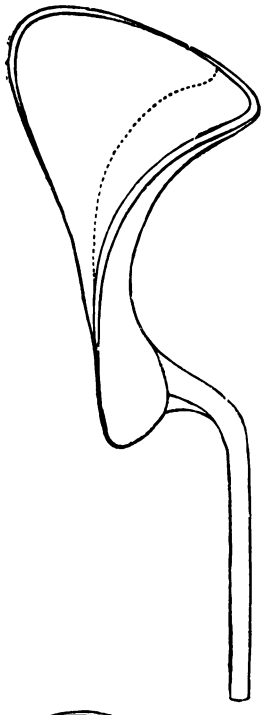
ADJUSTABLE LOWER IMPRESSION TRAY.

Patented August 24, 1886.



In this Tray, suggested by Dr. J. K. Wiley, the inner wall is cut through on either side, with slots running to the outer rim for adjusting the Tray by spreading, closing, or bending the sides.

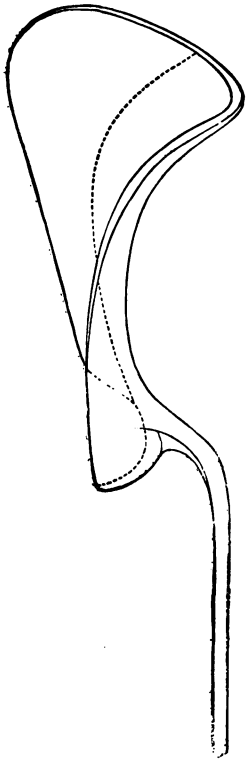
Price, Lower Tray, No. 17 (Adjustable) . 35 cents.

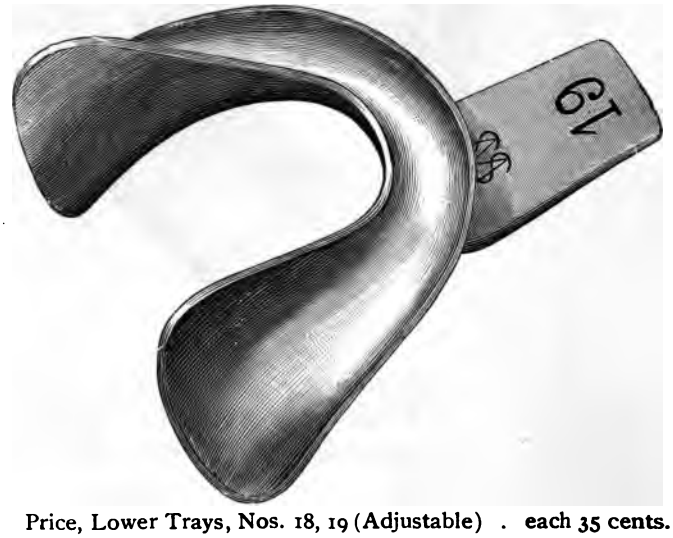


ADJUSTABLE LOWER IMPRESSION TRAYS.

Suggested by PROF. HENRY I. DORR.

The distinguishing features of these Lower Impression Trays are the posterior lingual wings, which enable the operator to obtain an accurate impression of the jaw on either side of the tongue. These wings may easily be spread apart, or brought toward each other, or twisted, or cut away to adapt the Tray to nearly any size or shape of the edentulous lower jaw.

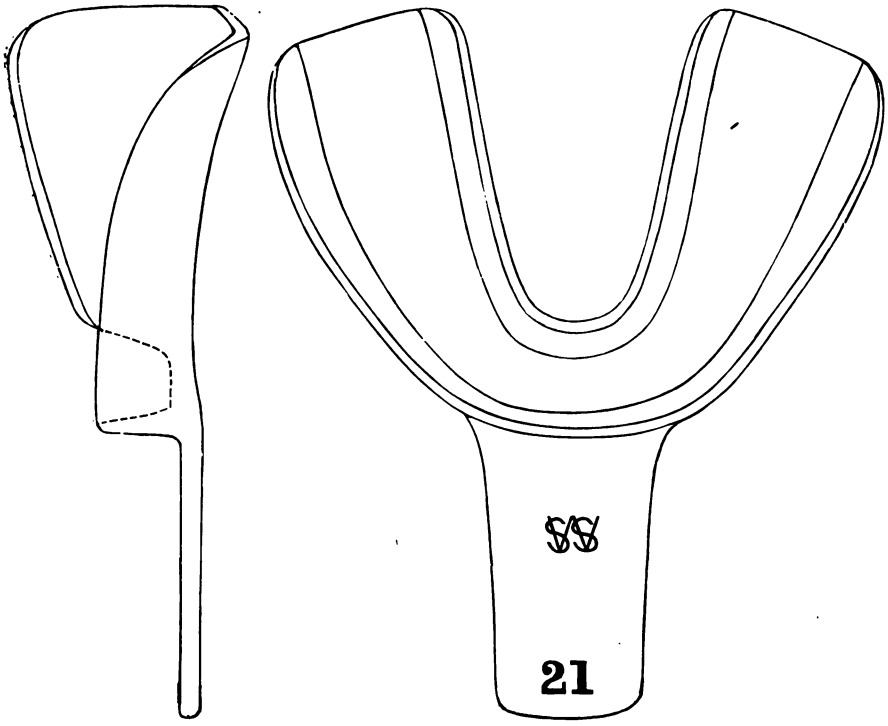


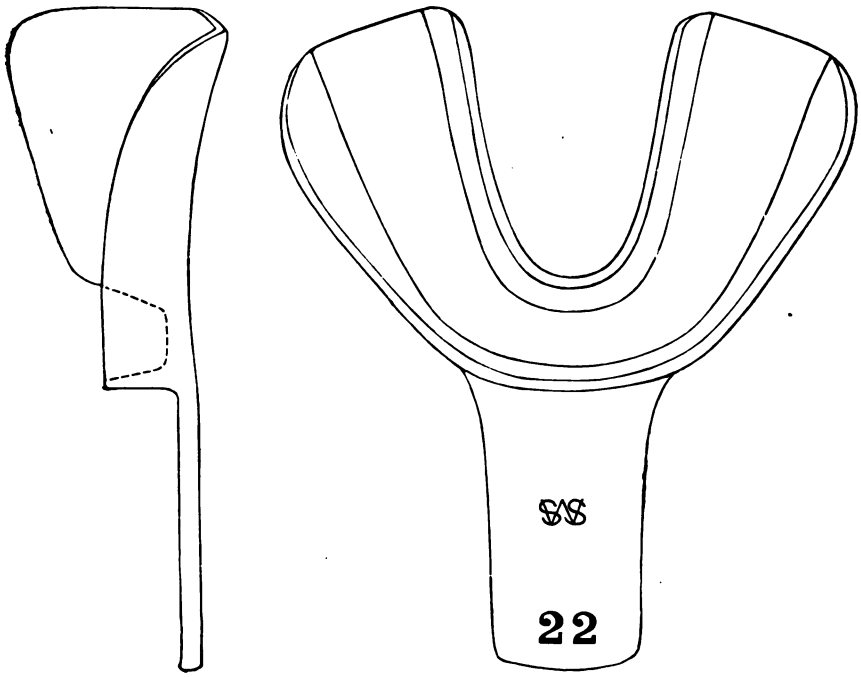


Price, Lower Trays, Nos. 18, 19 (Adjustable) . each 35 cents.

Deep Lower Impression Trays for Regulating.

Suggestion of Dr. P. F. Struppler.





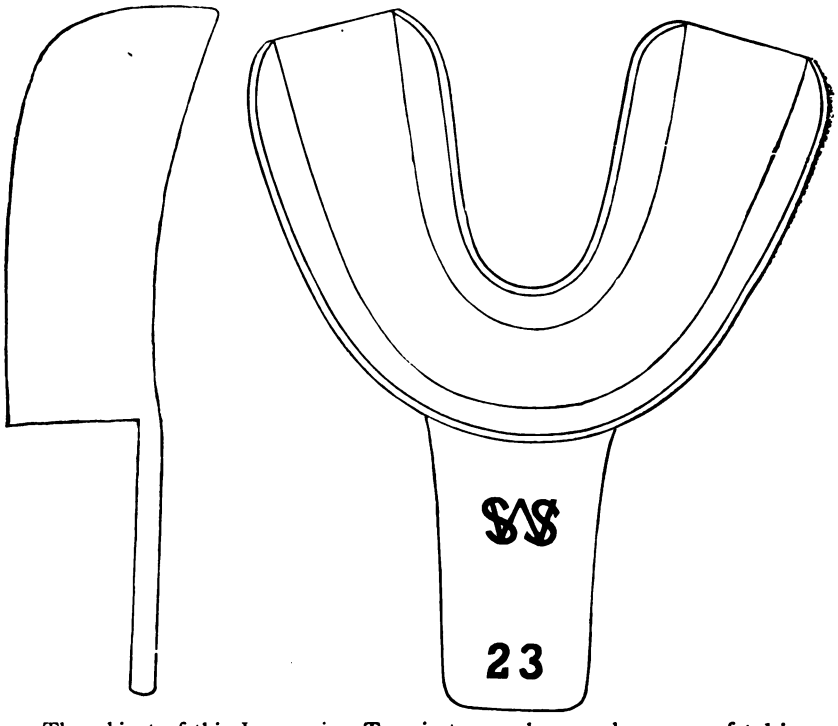
Nos. 21 and 22 are for cases where specially deep Trays are required. The **lingual extensions** are adapted to secure accurate impressions when the lower **molars are missing.**

Price, Lower Trays, Nos. 21, 22 . . . . each 35 cents.

LOWER IMPRESSION TRAY No. 23.

FOR PARTIAL CASES.

Suggested by Dr. H. B. Noble.



The object of this Impression Tray is to supply a ready means of taking impressions of the entire lower crowns and gum in cases where only a few teeth are missing. For this reason the walls, both outside and inside, are made high and strong, and run out almost flush with the ends.

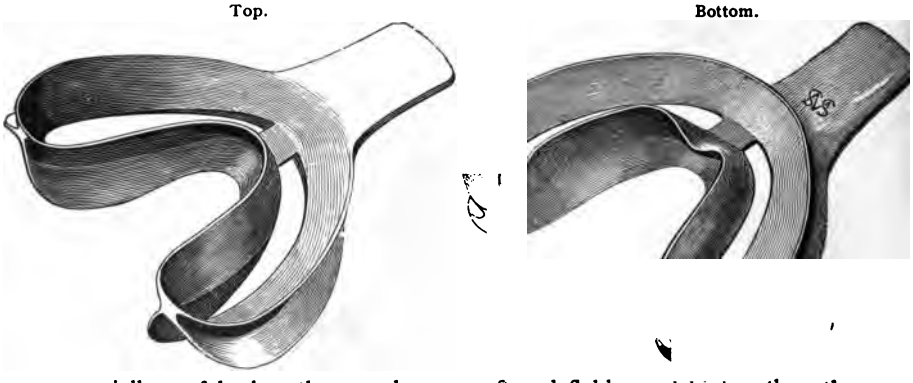
Price, Lower Tray No. 23 . . . . . 35 cents.

FRANKLIN'S LOWER IMPRESSION TRAYS.

Form I illustrates Dr. B. W. Franklin's Impression Tray, of which there are three sizes for taking impressions in plaster for lower dentures. They are

Form I.

Top. Bottom.



specially useful when the muscles are soft and flabby and higher than the maxillary ridge. They are readily extended or contracted by bending.

Price, Lower Trays, Franklin's . . . . . each 50 cents.

Following is Dr. Franklin's description of the use of his Tray:

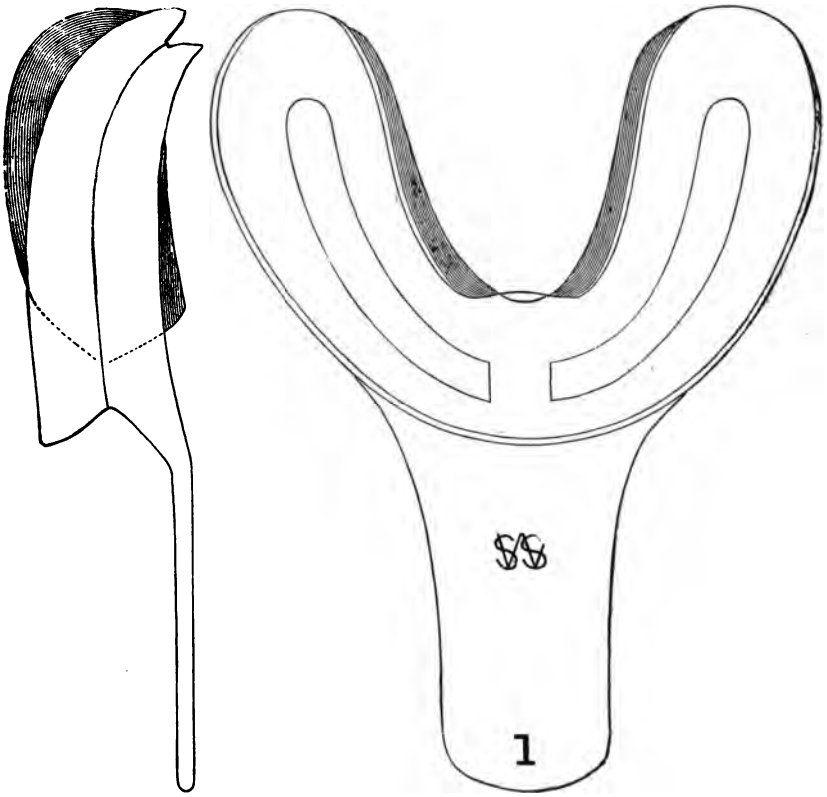
"This cup, or rather double cup, has a groove or space in its center all the way round. The advantages of this groove are, that when the lower part of the cup is filled, and the upper part one-fourth full of plaster, and placed in position over the ridge, the operator, with the end of the finger or other suitable means, can gently agitate the whole mass of plaster in the cup, and thus prevent air-bubbles, blanks, or other imperfections on the surface of the impression. The peculiar shape of the outer flanges of this cup is such as to distend the cheeks, while the lower inner edges, pressing upon the submaxillary and sublingual glands, depress them sufficiently to prevent any folds or ligamentous attachments from being embraced by the impression."

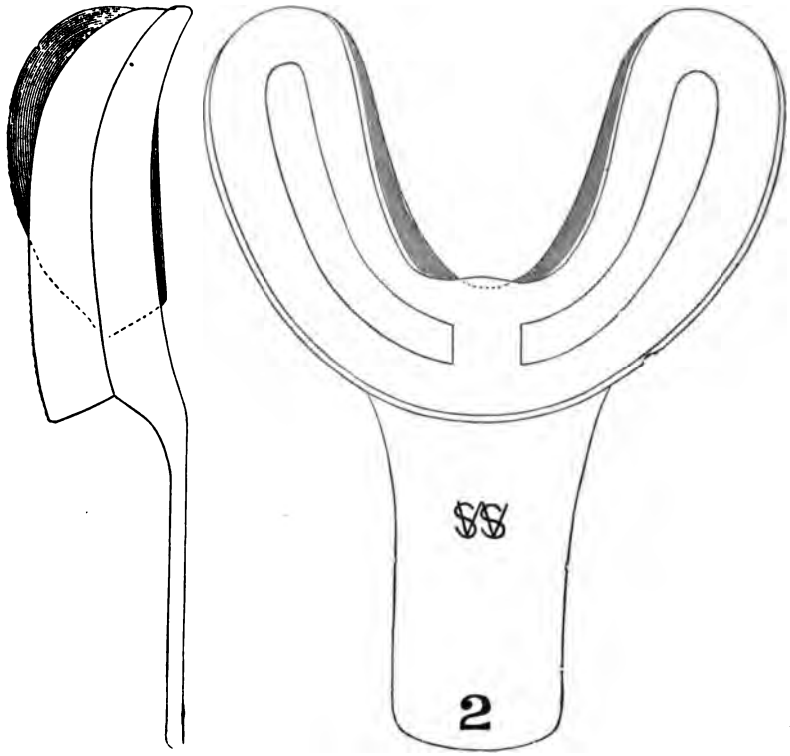
SAMUEL S. WHITE. Dear Sir:—I have examined the Trays made by you, known as "Franklin's Improved Impression Trays," and highly approve them. They meet my ideas better than any I have heretofore seen.

The handle is of proper length and in right position, clearing the lip and allowing the Tray to set down on the maxillary ridge. The edges of the Trays are so thin that they can be shaped to the maxillary by a pair of pliers, and may thus be readily adapted to different conformations.

The three sizes you manufacture seem to me to meet all the requirements.

Very truly etc., B. W. FRANKLIN.

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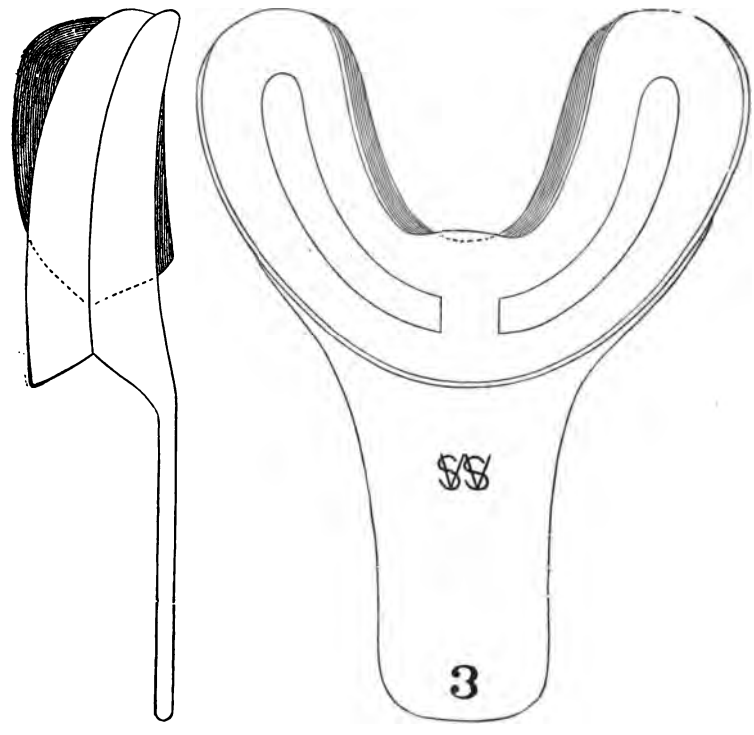

3

DENTISTS' PLASTER.

FOR TAKING IMPRESSIONS AND MAKING CASTS.

Our Dentists' Plaster has two points of superiority: Quality and honest dealing. Its quality needs no exploiting. It is known. With regard to the other point, a word may not be out of place. For a barrel we sell 300 lbs.; for a half-barrel, 150 lbs.; for a quarter-barrel, 75 lbs. The packages are never less, frequently more, and then the buyer gets the advantage. Our cans are packed by machinery, and contain the quantity they are advertised to contain every time; they have the name, etc., stamped in the lid as shown.

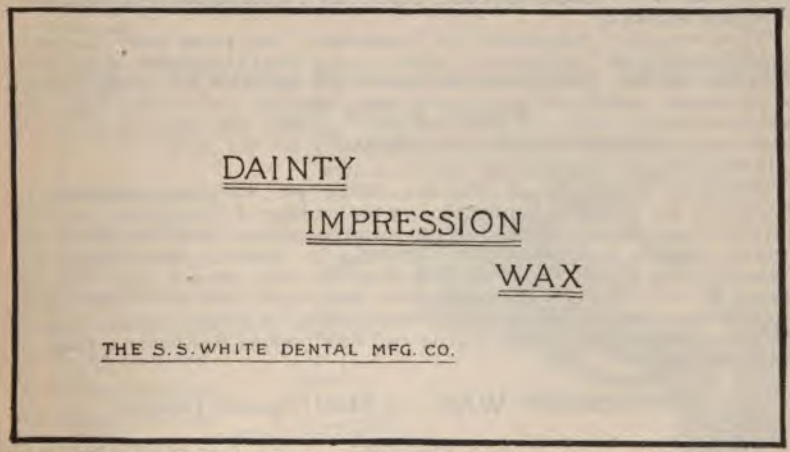
In ordering, state whether for casts or impressions. We keep both kinds on hand, and send that for casts, unless otherwise ordered.

PRICES.

Two-Quart Can	$0.30	Three-Peck Can	$2.00
Six-Quart Can	.75	Quarter-Barrel	1.60
Twelve-Quart Can	1.15	Half-Barrel	2.50
Half-Bushel Can	1.45	Barrel	3.50

These are the prices at Philadelphia. Freight and expenses added when sold at other depots. Boxing on cans, and porterage, extra.

DAINTY IMPRESSION WAX.



This Wax is designed for use in taking impressions for crown- and bridge-work.

It is made from white wax in thin sheets, and is readily softened over a small burner at the operating chair. It is so compounded that it can be softened by dry heat without the troublesome stickiness that is a fault of many preparations. It is extra tough, and takes a very clear, sharp impression.

Price . . . . . per lb. $1.20

Wax Impression and Base-Plate Preparations.

The wax in our Impression and Base-Plate Preparations is genuine old-fashioned beeswax.

When we sell a preparation as "pure wax," we mean pure beeswax, unadulterated with "earth-wax," tallow, or any other cheapening ingredient. What we sell for "gutta-percha and wax" will be found on the application of the proper tests to be gutta-percha and beeswax, and nothing else. So with our paraffin (white or pink) and wax: paraffin and beeswax are there in due proportion, without foreign admixture.

In short, we sell just what the label indicates.

Should we ever find that earth-wax, tallow, etc., have any usefulness to dentists in the taking of impressions or the making of base-plates, we shall have business sagacity enough to put up preparations containing them and courage enough to announce the fact. So far, however, these things are "useful" only to unscrupulous manufacturers, who employ them without regard to their effect on the compounds with which they are incorporated, because they cheapen cost and so increase profits,—a practice about on a par, ethically, with selling "gutta-percha and wax" which has never a trace of gutta-percha.

IMPRESSION WAX. In Half-pound Boxes.

PRICES.

Yellow Wax, in Enameled Boxes	per box	$0.38
Gutta-percha and Wax, in Enameled Boxes	"	.63
Pink Paraffin and Wax, " "	"	.50
White " " "	"	.50
White Wax	"	.60

BASE-PLATE WAX.

PUT UP IN ENAMELED METAL BOXES.

PRICES.

Yellow Wax	per box $0.50
Gutta-Percha and Wax	" .63
Pink Paraffin and Wax, Extra Tough . . .	" .50

Yellow Base-Plate Wax is put up in half-pound boxes containing sheets either 3¼ x 3⅛ or 5¼ x 3 inches. When ordering, please state which is preferred. Other Base-Plate Waxes are put up only in the oblong shape, 5¼ x 3 inches.

We would call special attention to our Gutta-Percha and Wax, which contains twenty per cent. of Gutta-Percha. All other makes, so far as brought to our notice, are merely colored to give the appearance of a Gutta-Percha compound.

EXTRA TOUGH PINK PARAFFIN AND WAX.

IN STICK FORM.

PUT UP IN ENAMELED METAL BOXES.

This Wax is put up in this convenient form for building up artificial dentures. It is prepared by an entirely original process, by which we are enabled to produce the toughest preparation ever offered.

Price, in half-pound boxes . . . . . per box $0.50

Modelling Composition for Impressions.

PUT UP IN ENAMELED METAL BOXES.

This preparation is regarded by many practitioners as superior to wax or any of its compounds for taking sharp, accurate impressions.

We formerly made four varieties, representing as many differences of tempering, as soft, medium, hard, and extra soft. Long experience has taught us that the medium, commonly known as No. 2, is best suited to the purposes of dentistry, the others serving only occasional needs in that direction. We have therefore decided to hereafter make only the one form, whose sales have so largely exceeded those of the other three combined as to settle the question of preference beyond a peradventure.

The following are the characteristics of our Modelling Composition, as it will hereafter be known. Of medium temper, neither too hard nor too soft, and adapted to all ordinary uses of the dentist; softens sufficiently, either in dry heat or hot water, the latter preferably; sets quickly, say in one and a half minutes.

Price, in half-pound boxes . . . . . per box $0.50

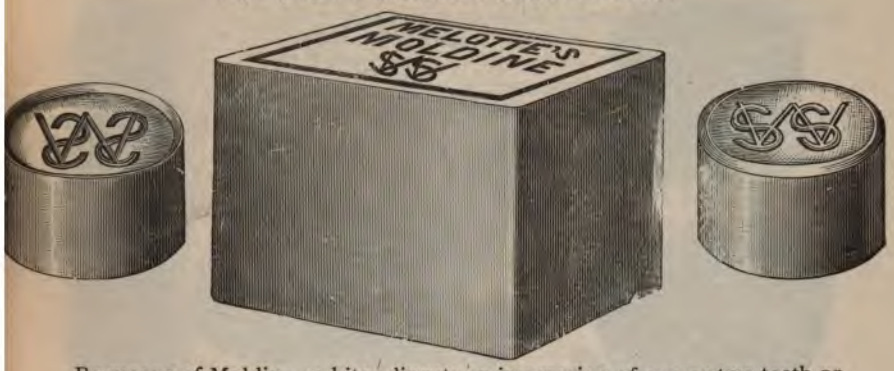
Modelling Composition for Base-Plates.

Put up in Enameled Metal Boxes.

At the suggestion of Dr. W. S. Elliott we have prepared the Modelling Composition in oblong sheets (5¾ x 3 in.) as a substitute for wax, or gutta-percha and wax, for base-plates or "trial plates." It is said to have very decided advantages over anything else which has been on the market for such purposes.

Price, in half-pound boxes . . . . . per box $0.63

DR. MELOTTE'S
Moldine, Impression Cup, Ring, and Fusible Metal.
FOR CROWN DIES AND COUNTER-DIES.



By means of Moldine and its adjuncts an impression of one or two teeth or roots may be taken and a die and counter-die made in less than five minutes. Gold caps or regulating fixtures may be accurately fitted by means of the dies thus quickly formed. Dr. Melotte and other dentists have found these devices to simplify and expedite crown- and bridge-work. Moldine is also an immediate investient for work to be soldered; solder will not flow over the inside of a collar filled with Moldine, or over the inside of its cap. Metal work may be thus made or repaired without waiting a moment for the Moldine investient to dry or set. If Moldine stiffens by use, knead in a little glycerin.

Printed instructions accompany each package.

In ordering Moldine to be sent by mail please add the postage (20 cents for the complete apparatus; 10 cents for the material alone) to the remittance.

PRICES.

Complete Outfit, inclosed in a tin box containing one-half pound Moldine, one Cup, one Ring, and two ingots of Fusible Metal		$1.50
Melotte's Moldine	per half-pound	.50
Impression Cup (S. S. W. No. 20, see page 43)	each	.25
Rubber Ring	"	.05
Fusible Metal, per ingot (about 2½ ounces)	"	.38

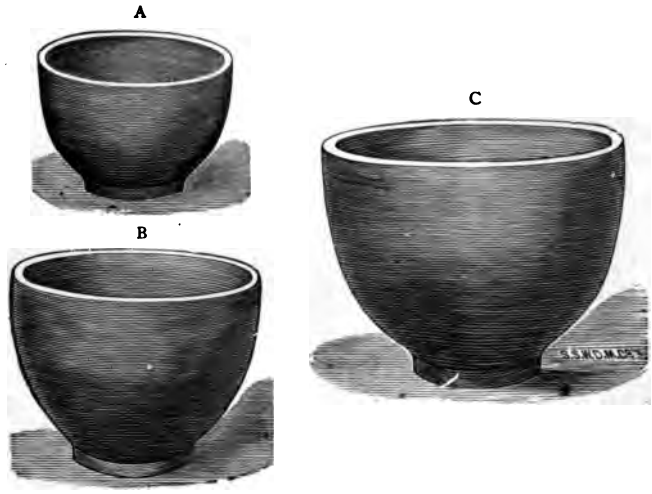
WAX KNIFE CLEANER.

Suggested by DR. B. F. COSBEY.

The melted wax which accumulates on the knife is readily removed with this Cleaner, which consists of a half-cylinder of lead, with a thin steel blade cast in its crown. The ends or heads of the lead block can also be used advantageously as a soft anvil in riveting metal backs on teeth for plate-work, etc., the curve of the edge making it very convenient for such use.

Price . . . . . 50 cents.

RUBBER BOWLS FOR MIXING PLASTER.



These Bowls of soft vulcanized rubber cannot be broken; their sides can be pressed together to form a lip or spout for pouring thin-mixed plaster; and any unused plaster of the mixing which sets in them can be thoroughly crushed and readily removed by squeezing the sides of the Bowls together. Their superiority has made for them a place in almost every dental laboratory. Three sizes, A, B, and C.

Prices,	A,	3¼	in.	diam.,	2¼	in.	deep	. .	each	$0.50
"	B,	4	"	"	2¾	"	"	. .	"	.60
"	C,	4½	"	"	3½	"	"	. .	"	.80

SPATULAS.

17,	Spatula or Palette Knife, with Patent Bolster,							four-inch	$0.25
18,	"	"	"	"	"	"	"	five- "	.30
19,	"	"	"	"	"	"	"	six- "	.40
19½,	Special	.	.	.	.	.	.	four- "	.30

COATINGS FOR PLASTER CASTS.

Collodion, in 2-oz. bottles, with Brush .	per bottle	$0.40
" " 6-oz. "	"	.80
Sandarac Varnish, in 2-oz. bottles . .	"	.25
Extra Shellac Varnish, in 2-oz. bottles .	"	.25
Liquid Silex, in 2-oz. bottles, with Brush .	"	.20
Elliott's Parting Fluid	"	.25
Gilbert's Imperial Varnish	"	.25

ARTICULATING PAPER.

The manufacturer of this well-known English preparation claims that it is entirely free from oil, smell, or taste; is chemically unchangeable, and almost everlasting. No other means so readily and effectually shows defects in the bite or articulation. Put up in boxes containing one dozen sheets.

Price, Thick or Thin Sheets . . . . per book **8 cents.**

Spatula or Palette-Knife.

LABORATORY AND OFFICE KNIVES.

Nos. 1 and 2. For trimming plaster casts and rough work in laboratory.

Price . . . . . each 15 cents.

Nos. 3 and 4 are specially adapted for trimming around the teeth in waxing up and after vulcanizing.

Price . . . . . each 25 cents.

No. 5. OFFICE KNIFE.

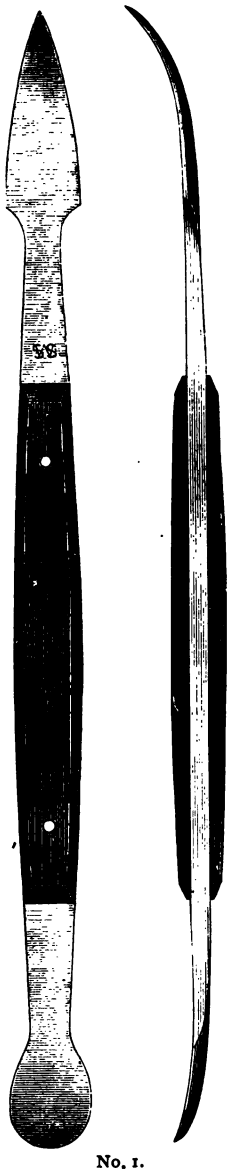
The blade is made of best quality steel, and the handle of snakewood. Purposely made with a fixed blade so that it will be kept specially for the operating-table, and readily found when wanted for use.

Price . . . 75 cents.

Nos. 3, 4, and 5 are our own manufacture. Forged-steel blades.

No. 1. No. 2. No. 3. No. 4. No. 5.

SPATULAS.



No. 1.

No. 2.

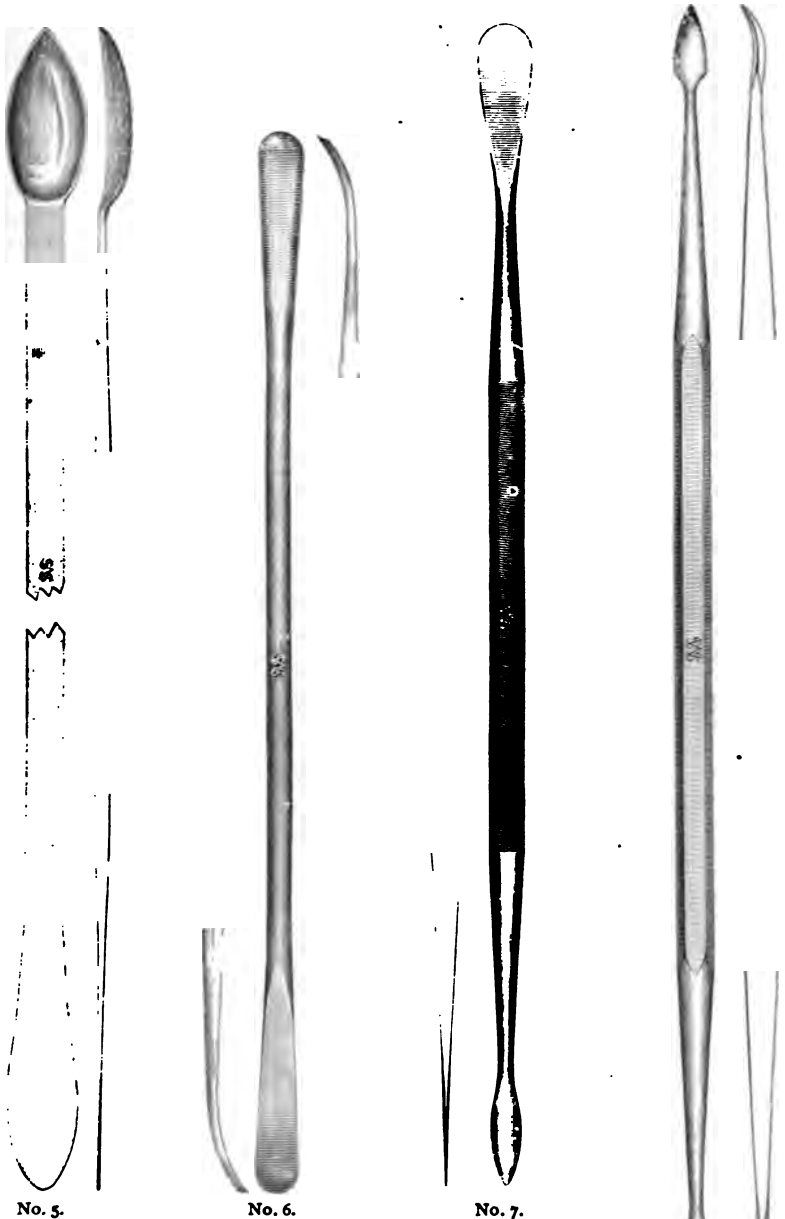
No. 3.

No. 4.

WAX SPATULAS.

No. 1, Ebony Handle	each 75	cents.
" 2, Octagon Steel Handle	" 40	"
" 3, File-cut Steel Handle	" 40	"
" 4, Fahnestock's	" 60	"

SPATULAS.



No. 5. No. 6. No. 7. No. 23.

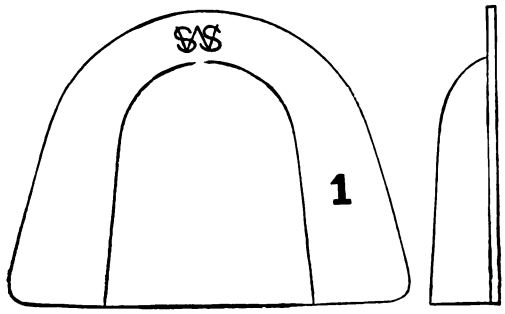
WAX SPATULAS.

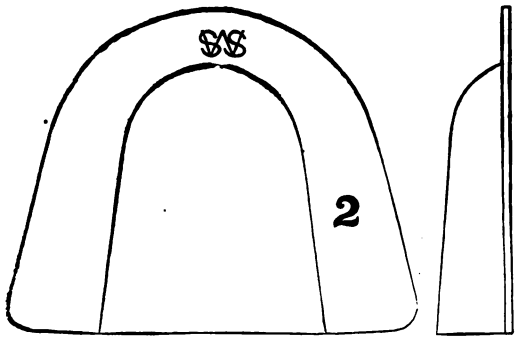
No. 5,	Spoon-shaped, Steel	each 25 cents.
" 6,	Round, Bright,	" 20 "
" 7,	Beale's Pattern,	" 50 "
" 23,	Designed by Dr. W. H. Dorrance, for carving wax forms	" 50 "

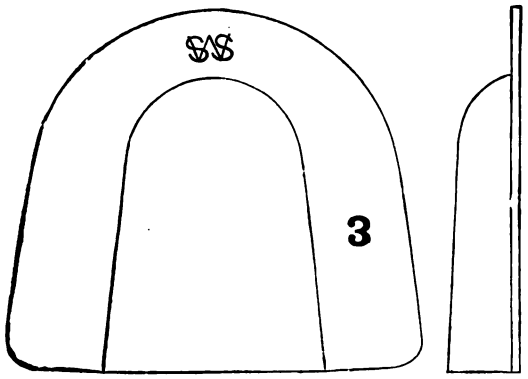
TRUE BITE PLATES.

Patented July 3, 1894.

FIG. 1







A true bite and an accurate impression are prime factors in the process of making a successful complete or partial denture. To save time, get an exact tooth-length gauge and a correct articulation, the bite should be taken at the first sitting. This can now be readily done by the use of the True Bite Plates which we supply in eleven sizes: The Uppers are Nos. 1, 2, 3, 4, 5,—the cut, Fig. 1, shows the smallest size. The Lowers are Nos. 6, 7, 8, 9,—the cut, Fig. 6, shows the smallest size. The combined Upper and Lower Duplex are shown in Nos. 10 and 11.

Fig. A shows an upper Bite Plate in the mouth, the wax W cut away from gum G to gauge artificial tooth back length.

Fig. B shows the same with the wax on the under side of the Bite Plate, to take articulation of the lower teeth.

The soft yet sufficiently stiff and thin metal of the Bite Plates may be sheared for change of edge contour, bent for adaptation, or cut with Plate Nippers for partial cases (see Figs. C and D). For detailed descriptions of the wide range of Bite Plate uses see the DENTAL COSMOS, September, 1894, page 692, and October, 1894, page 781.

TRUE BITE PLATES.

Patented July 3, 1894.

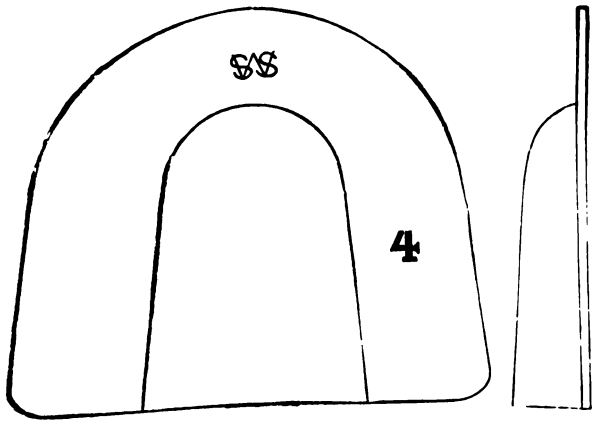


FIG. A.

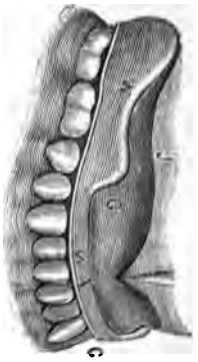
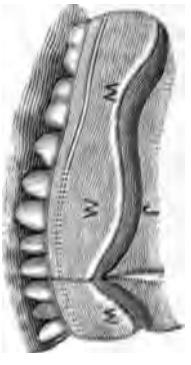


FIG. B.



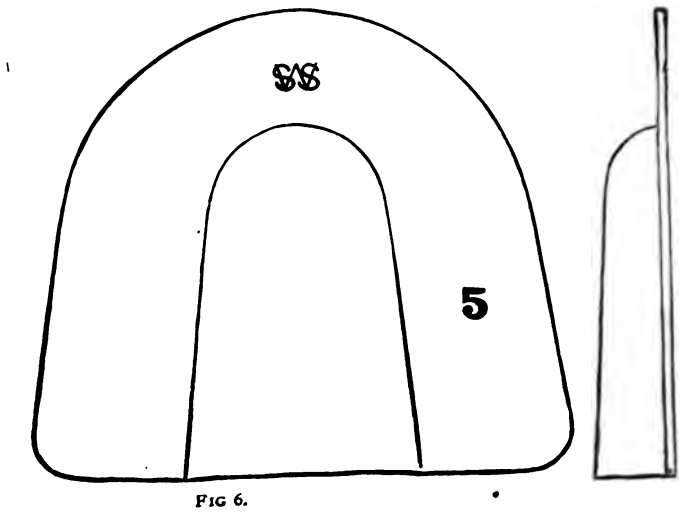
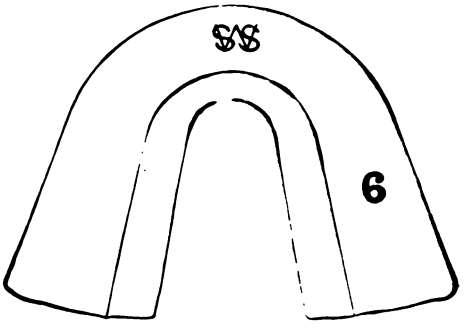
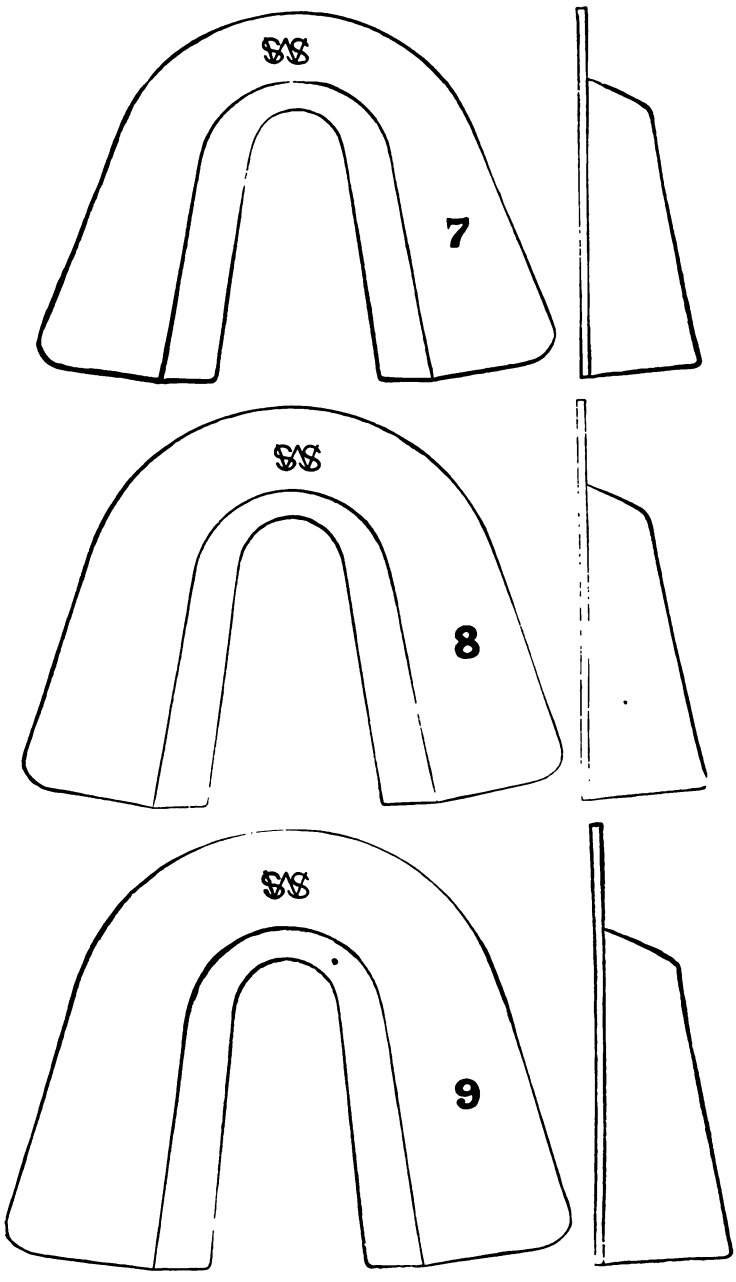


FIG 6.



TRUE BITE PLATES.

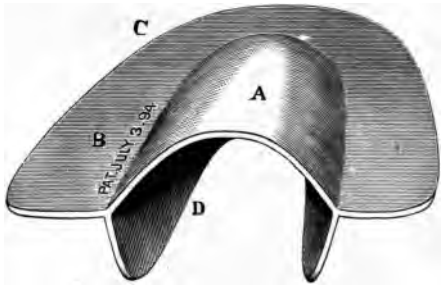
Patented July 3, 1894.



TRUE BITE PLATES.

Patented July 3, 1894.

No. 10.



No. 11.

FIG. C.

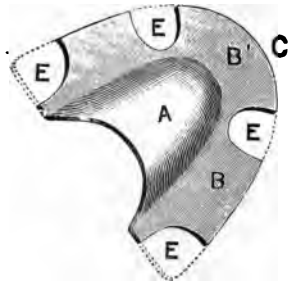
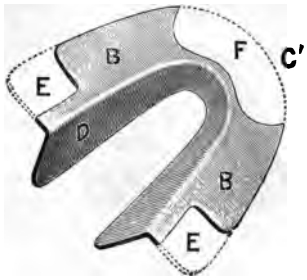


FIG. D.



Figures C and D show how with the plate-nippers the dentist can convert an upper or lower Bite Plate into a partial one to suit the case in hand.

PRICE.

True Bite Plates,	Upper, Nos. 1 to 5	each	$0.20
" " "	Lower, Nos. 6 to 9	"	.20
" " "	Upper and Lower Duplex Nos. 10 and 11	"	.35
" " "	Complete Set, Nos. 1 to 11 . .	per set	2.25
" " "	Trial set of Four, Nos. 2, 3, 7, and 8	"	.75

FIG. 1.

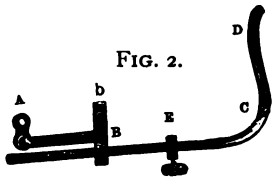
Dr. G. K. Bagby's Bite Trays.

Patented July 25, 1893; July 3, 1894.

Fig. 1 shows at A the upper and at B the lower sides of a Tray designed to take the bite at a single impression in wax placed in each side of the Tray. Fig. 2 shows a jaw gauge for measuring the jaw length of the case in hand.

The inventor claims that by the use of the Tray a correct bite can be taken at the first sitting, and then with the jaw gauge the models from the usual impression can be set in the articulator to exactly duplicate the jaw length of the patient, and therefore the denture can be finished with a certainty that it will be correctly articulated. The time saved and the uncertainty thus avoided constitute the claimed advantages of the apparatus. Descriptive circulars accompany the invention.

FIG. 2.



The Trays are made of vulcanized rubber and are in two sizes.

The Gauge is of metal, nickeled.

Price . . . . per set $3.00

SPYER'S AUTOMATIC SUCTION CAVITY.

Patented in the United States, England, France, Germany, and Canada, September 4, 1894.

FIG. 1.

FIG. 2.

FIG. 3.

The Surface-Cohesion Plates of Dr. Spyer, which have been so long known and so widely used, demonstrated his close study and his accurate knowledge of the needs of that class of work. He now presents a new device to enable the dentist to construct a narrow plate with perfect adhesion. This he calls an Automatic Suction Cavity. As sold it is shaped for the model, and it is readily trimmed with curved scissors to meet the requirements of particular cases.

Fig. 1 is a view of one of Spyer's Automatic Suction Cavities as sold. Fig. 2 shows the method of applying to the model, from which it will be seen that the alveolar ridge is not trenched upon, but left free so that the teeth can be set up, and the case flasked, packed, and vulcanized as usual.

There is nothing complicated about the process of applying the Automatic Suction Cavity, which of course is removed after the plate is vulcanized.

The palatal surface of a finished plate is seen in Fig. 3, showing the form of suction by which strong adhesion is provided from end to end of the plate.

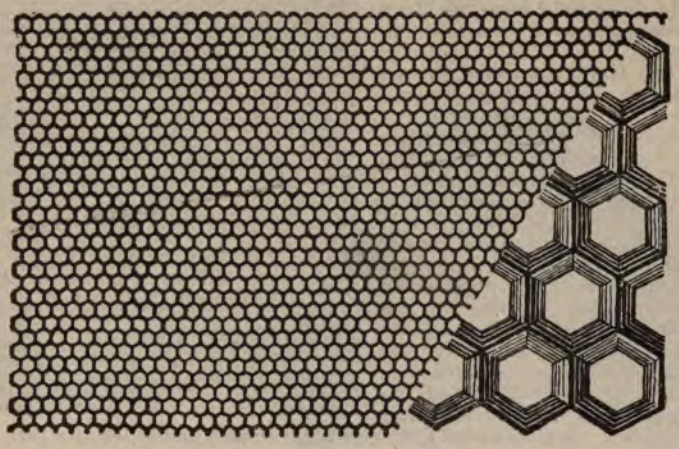
Spyer's Automatic Suction Cavities are put up in boxes of 12, with *full directions for use.*

Price, per box $1.00

THE S. S. WHITE DENTAL MFG. CO., Agent.

COMBINATION DENTURES.

Invented by Dr. R. WÜNSCHE, Annaburg, Germany.



This is a perforated metal plate, by the use of which, in combination with rubber, dental plates may be made much thinner than if made of rubber only.

It is perhaps not too much to say that combination plates of this material may be one-half the thickness of pure rubber and yet be twice as strong.

The cut shows the full size of the plates. A part of the plate on the right shows the perforations as they appear under a strong magnifier.

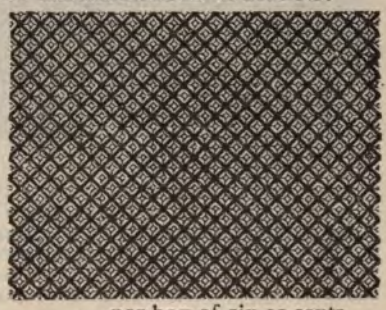
It will be seen that the holes are countersunk, so that when the rubber is forced through it forms a head or clinch on the face of the plate, making it impossible to detach the plate by any ordinary force.

Each box of plates will contain full directions, with illustrations of their application to whole and partial dentures.

PRICES.

No. 1, Aluminum Plates	each	$0.35
" " "	per box of six	2.00
No. 2, Victoria Metal Plates (gold colored)	each	.60
" " " " " "	per box of six	3.50

Dr. Wünsche's Metal Adhesion Plates.



These plates are of very strong white metal, enabling the dentist to dispense with the vacuum-chamber in upper dentures, besides adding very much to the strength of the case.

The material is sufficiently hard to prevent the flattening of the convexities under any necessary pressure.

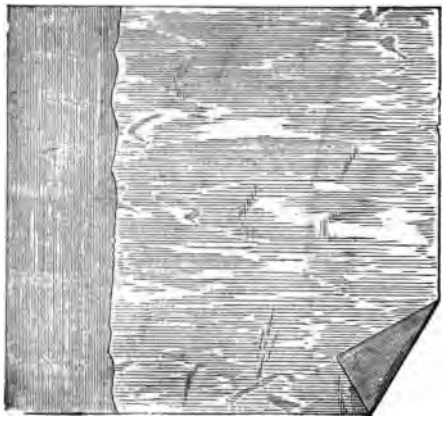
Each box will contain full directions.

Price	per box of six 25 cents.
"	each 5 "

THE VULCAN GOLD LINING.

A PERFECT GOLD COVERING FOR RUBBER PLATES.

Patented October 22, 1889.



In this Gold Lining we claim advantages over others as follows:

The Gold is applied in one piece to the surface to be covered.

No extra care is required in packing the flask.

The Lining is composed of chemically pure Gold with a thin covering of pure Silver. The union between the rubber plate and the Gold Lining is mechanical; the sulphur in the rubber when set free by the action of vulcanizing corroding the surface of the silver, to which the rubber adheres perfectly. The sheets are of the thickness of No. 20 foil, and each book contains about forty-eight (48) square inches,—more than enough to cover six ordinary size plates on one side, or four plates on both sides. Having received occasional requests for a heavier lining, we are prepared to supply it of the thickness of No. 40,—the books containing half the number of square inches of the No. 20.

If the rubber plate is covered on both sides it is tougher when vulcanized, for the reason that during this process the pressure against the metal gives the plate a surface more dense than it will have if vulcanized in contact with plaster.

Price . . . . . per package $5.00

Surface-Cohesion Forms for Artificial Dentures.

Invention of Dr. Joseph Spyer. Patented January 6, 1885; December 8, 1885.

Fig. 1.

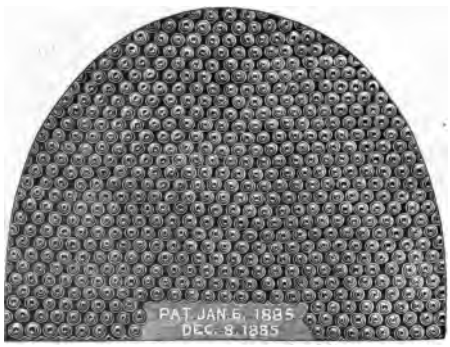
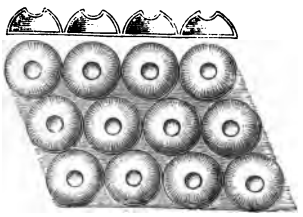


Fig. 2.



A thin metallic Form, the surface of which is covered with minute papilliform prominences—shown in Fig. 2 magnified four diameters—which by displacement of mucus at the points of gum contact effect surface cohesion as if the denture were glued to the gums, yet cause no irritation and leave no marked indentations. Adapted for either upper or lower plates. By the aid of this device strong cohesion can be had with a narrow plate, and thus the sense of taste be left unimpaired. Lower plates so made are very firm. Put up in packages containing one dozen Forms size of Fig. 1, which can be cut for either upper or lower plates. Full directions accompany each package.

Price . . . per box containing one dozen Forms 25 cents.

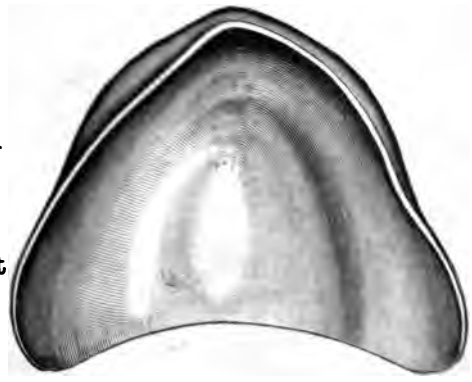
Rubber Cement . . . . . per bottle 25 "

These Forms are also made of Gold with a thin lining of Silver, similar to our Vulcan Gold Lining, and for like use. Thickness of No. 120 Foil.

Price . . . . . each $2.50

The Ideal Dental Base-Plate.

Plastic as Wax.
Rigid as Metal.
Fits like a Glove.
Does not
"Crawl" from the Cast,
nor Soften under the Heat
of the Mouth.



Having purchased the formula for making the Ideal Base-Plate from Dr. Head, it is now made under our own supervision, and may be relied upon to meet all the requirements suggested by its name.

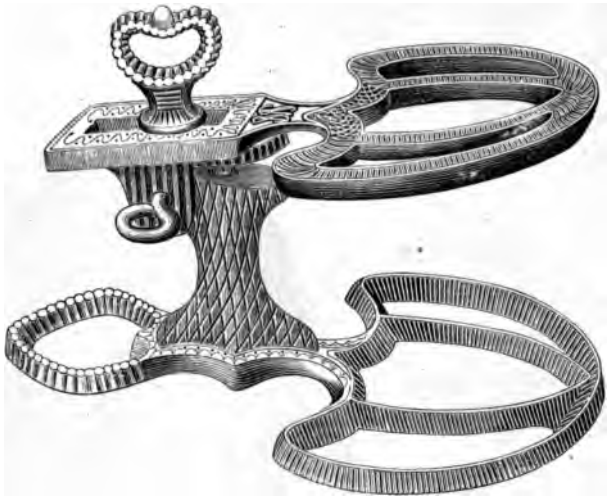
The Ideal Dental Base-Plate is a fixed compound of a brownish color, which is supplied in thin sheets, about 3¼ x 2½ inches. It is hard and, though not easily broken, is somewhat brittle. Held in boiling water, or over a spirit lamp for a few minutes, it softens, and can then be molded easily and rapidly to fit the most minute inequality of the cast as closely as a vulcanized rubber plate. It hardens in a few minutes and is then only inferior in stiffness to a metal plate of the same thickness, and retains its shape as unchangeably. When softened it can be cut with shears; when hard it can be trimmed to any form with a file, even to a feather edge. For trial-plates for taking the bite it is unequaled. It has been—not merely can be, but *has been*—used to mount teeth for actual service in the mouth for a week or so. It does not change its form in the heat of the mouth, but retains its position like a metal plate, neither softening nor pressing out of shape. If broken it is easily repaired, and when repaired is as strong as ever.

Put up in boxes containing 12 sheets.

Price . . . . . per box, $0.50

ARTICULATORS.

No. 1.



Made of brass, lacquered, having a screw and hinge whereby it can be adjusted to any desired angle. The top plate slides either backward or forward, and is held where desired by a set-screw.

Price $1.00

No. 2.

Made of brass. More substantial and better finished than No. 1. It has the same movements, with the advantage that the top plate can be thrown all the way back, and that the set-screw for raising the top plate is more conveniently arranged. This Articulator is nicely finished in all its parts.

Price, Polished and Lacquered $2.00
" Nickel-plated 2.50

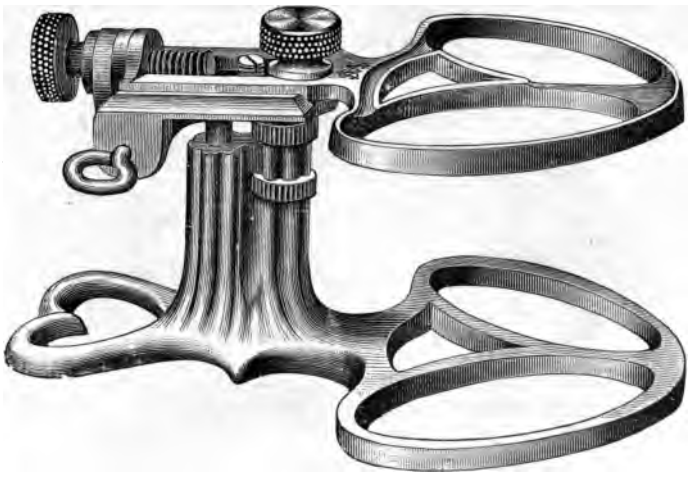
PLAIN-LINE ARTICULATOR.

Of the same general design as No. 2, but not so finely finished. Nickel-dipped. It is made to meet a demand for a low-priced article, and is fully equal, if not superior, to any offered elsewhere.

It is designated "Plain-Line."

Price . . . . . 90 cents.

No. 4.

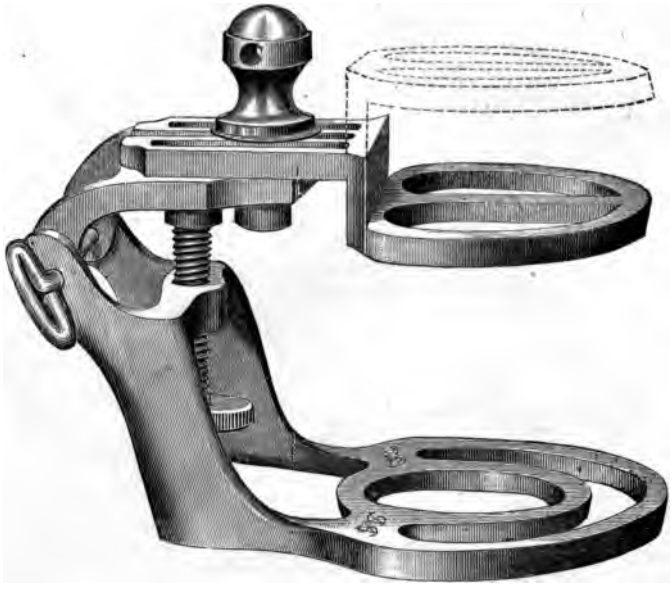


The upper plate has a horizontal adjustment of three-eighths of an inch, and a vertical range of one inch. It has also a pivotal motion, and may be set at any angle or position.

Price $2.50

ARTICULATORS.

No. 6.

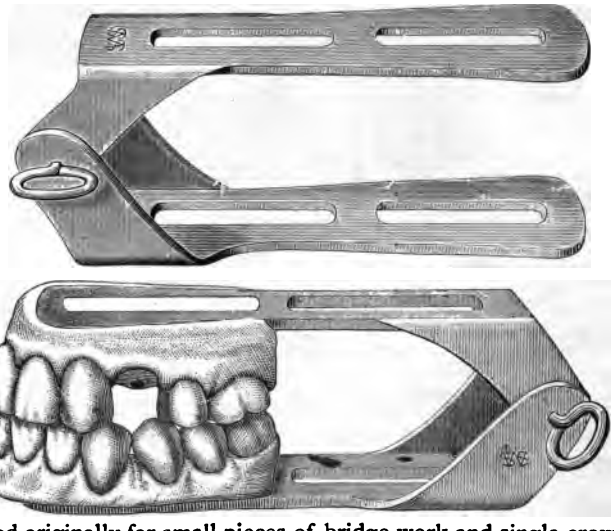


This Articulator is a modification of our No. 2, having all its movements. The upper plate has a double bend, so that when reversed, as shown by the dotted lines in cut, the space between the plates is increased one inch, giving ample room for extra length of bite in upper and lower dentures.

Price, Polished and Lacquered $2.00
" Nickel-plated 2.50

CROWN ARTICULATOR.

Suggested by Dr. P. G. C. HUNT.

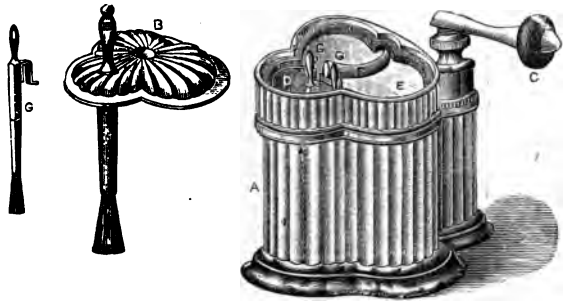


Designed originally for small pieces of bridge-work and single crowns, but particularly well adapted to the adjustment of small or partial dentures, as it affords a view of the palatal as well as the buccal faces of the teeth.

Price, Brass, Nickel-dipped . . . . . each 25 cents.

CLOVER-LEAF HOLDER FOR VARNISH.

Patented June 17, 1890; Aug. 12, 1890; Dec. 15, 1891.
In England, June 17, 1890.



This appliance, originally devised for a mucilage holder, so exactly supplies the needs of the dental office and laboratory by providing a neat, cleanly, economical receptacle for the various forms of varnish, that we have secured the agency for its sale for that purpose. The body is of glass with nickeled mountings and cover. It contains two compartments, the larger for the varnish, the smaller for the brushes, of which there are three, a large one attached to the lid, and two smaller ones which depend from the partition between the compartments by means of a little hook. Across the main compartment is a scraper to remove surplus varnish from the brushes. The lid is held in place upon a rubber ring with a firm pressure by means of a rubber wheel attached to a swinging lever. This makes the holder air-tight and prevents evaporation of the varnish. The brushes are specially made for varnish, of fine goat's hair, which is better for the purpose and more durable than camel's hair. A little alcohol placed in the brush compartment keeps the brushes pliable and is convenient for thinning the varnish when desirable.

On the whole, the Clover-Leaf Holder is a decidedly useful appliance. It is convenient and economical from the practical side, and neat, even ornamental, in appearance.

Price, complete $1.25
Additional Small Brushes . . . . . each .15

VULCANITE AND CELLULOID:

INSTRUCTIONS IN THEIR PRACTICAL WORKING

FOR DENTAL PURPOSES.

By S. ELDRED GILBERT, D.D.S.,
Instructor of Clinical Dentistry in the Philadelphia Dental College.

The aim of the author in the production of this volume has been to present the subject-matter as concisely and plainly as possible, as the work is designed especially for the use of students. Practical hints upon the taking of impressions of the mouth are first given, and these are followed by a consideration of materials and processes, step by step, up to the completion of the case.

Price, cloth . . . . . 75 cents.

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Cleansing Paste for the Hands.

Laboratory grime sticks to the hands in spite of soap and scrubbing. Our Cleansing Paste removes it easily, neatly, and completely. All you do is to moisten the hands, put a little of the Paste on the palms, rub thoroughly, and then wash off, leaving the hands soft and white. No "chapping."

Put up in enameled metal boxes, 3½ x 3½ x 1½ inches.

Price . . . . . per box 30 cents.

See that you get our Paste, and not a substitute.

CELLULOID BASE.

We claim that Celluloid is the best plastic base offered to the profession,—free from all objections of color, taste, danger of mercurial poisoning, etc., incident to the rubber base. Our plates are to be found at all dental depots. We do not receive orders at the factory.

PRICES.

UPPERS,	No. 3	No. 3½	No. 4	No. 4½	No. 5	No. 5½	No. 6	No. 6½
	16c.	20c.	18c.	22c.	22c.	25c.	27c.	29c.
UPPERS, 'A,'	No. 3	No. 3½	No. 4	No. 4½	No. 5	No. 5½	No. 6	No. 6½
	23c.	24c.	24c.	28c.	30c.	30c.	39c.	44c.
LOWERS,	No. 1½	No. 2	No. 2½	No. 3	No. 3½	No. 4	No. 4½	
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	27c.	36c.	43c.	35c.				
PARTIALS,	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10		
	8c.	10c.	13c.	16c.	14c.	18c.		

A chart, showing the exact size of each plate, with the price marked upon them, together with a pamphlet of instructions in the use of the Celluloid Base, will be mailed to any address upon receipt of a request so to do.

CELLULOID MANUFACTURING CO.

Sole Agent for the United States,

THE S. S. WHITE DENTAL MFG. CO.

DENTAL RUBBERS.

Bow-Spring Rubber.

Just as worthy of its place as the leading high-grade rubber of the world as it was twenty years ago, because it is made the best. It is cheaper than others because it takes more sheets to make a pound, and because on account of its greater strength it can be made into thinner plates.

Sold in Thick (ordinary) or Thin sheets. In ordering, state which is wanted. We send the "Regular," or Thick, unless otherwise ordered.

Trade-Mark No. 1625, Registered June 25, 1872; and No. 20,240, Registered July 5, 1892.

PRICES.

Less than 5 lbs. . .	per lb. $2.75	In 10-lb. lots . .	per lb. $2.25
In 5-lb. lots . .	" 2.50	In 25-lb. lots . .	" 2.20

S. S. White's Dental Gum, No. 1 Improved.

Of a somewhat lower grade than Bow-Spring, requiring less care in vulcanizing, but carefully and properly made so as to produce plates of great strength.

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Less than 10-lb. lots	per lb. $2.25	In 25-lb. lots . .	per lb. $1.90
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The S. S. White Dental Mfg. Co.'s Pink Rubber.

Equal in desirable qualities—color and toughness—to the best of the higher-priced brands. Put up in half-pound boxes.

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Of a more delicate shade of coloring than the regular Pink.

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In 5-lb. lots . .	" 4.75		

The S. S. White Dental Mfg. Co.'s White Rubber.

Price . . . . . per lb. $4.00

The S. S. White Dental Mfg. Co.'s Black Rubber.

Price . . . . . per lb. $2.25

Poulson's Pink Rubber.

Price . . . . . per lb. $3.50

We also sell all other makes of rubbers at manufacturers' prices.

THE S. S. WHITE DENTAL MFG. CO.,

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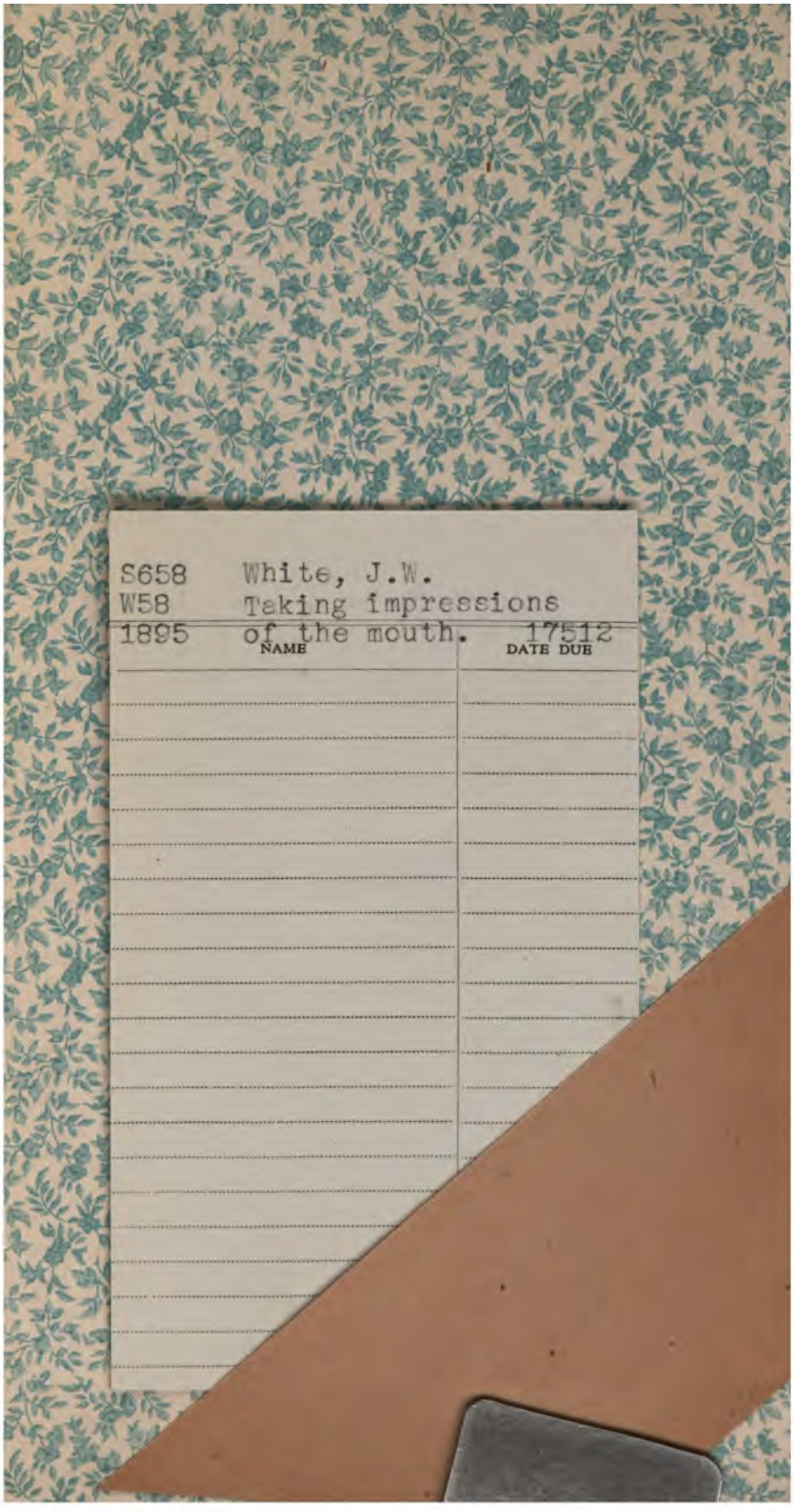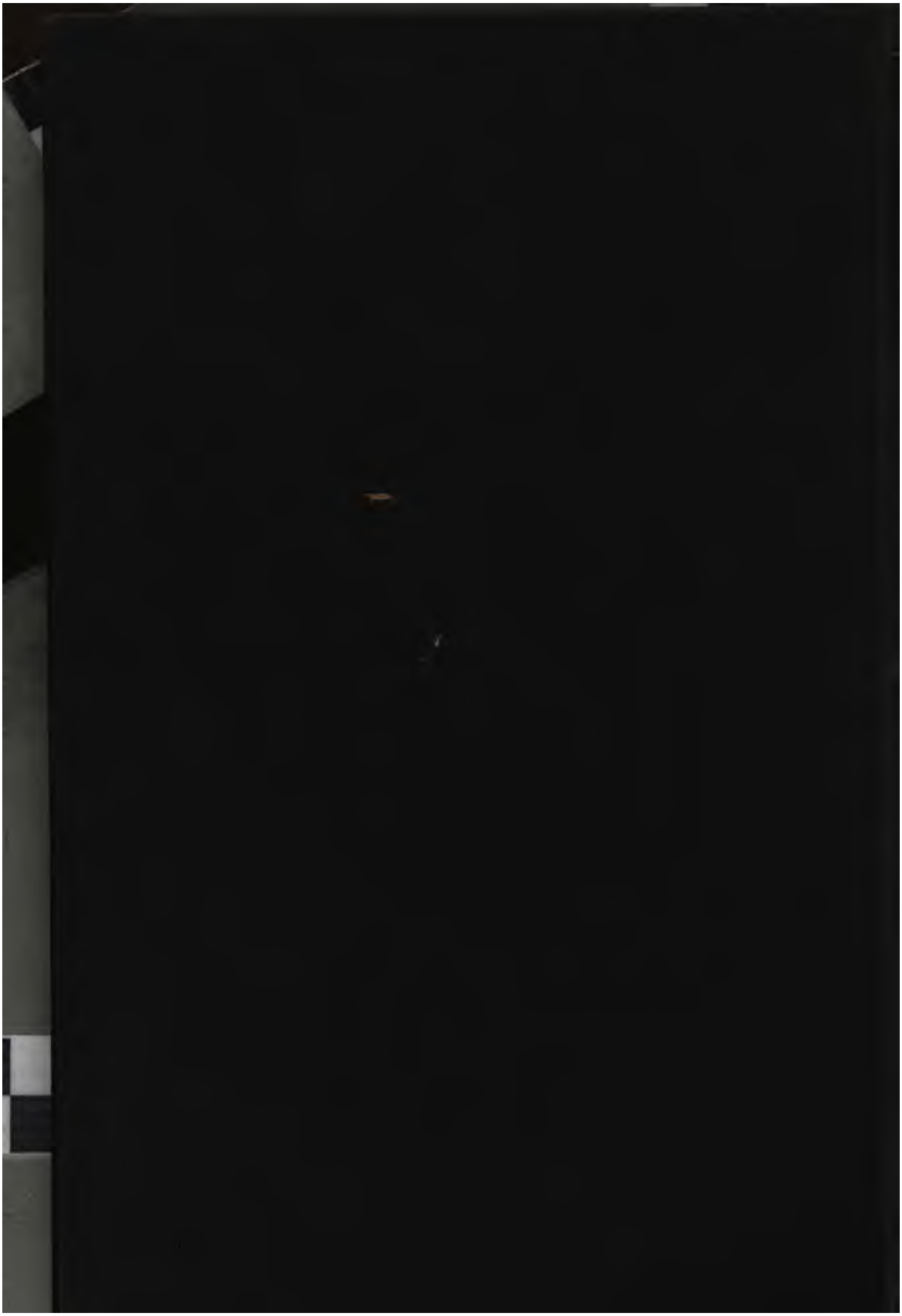
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W58 Taking impressions
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